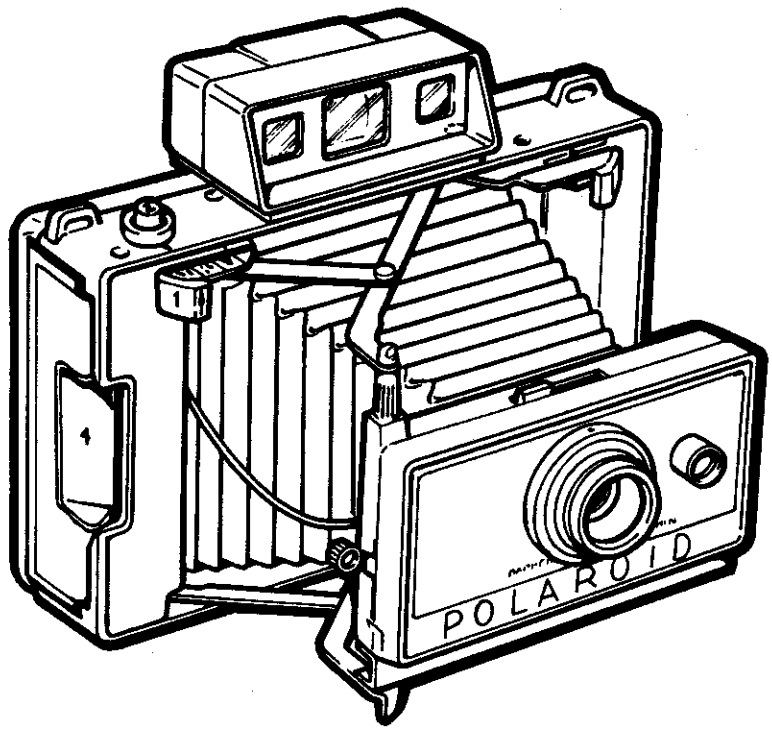
REPAIR MANUAL

100 - 200 - 300 SERIES
AUTOMATIC PACK LAND CAMERA

MARCH 1970



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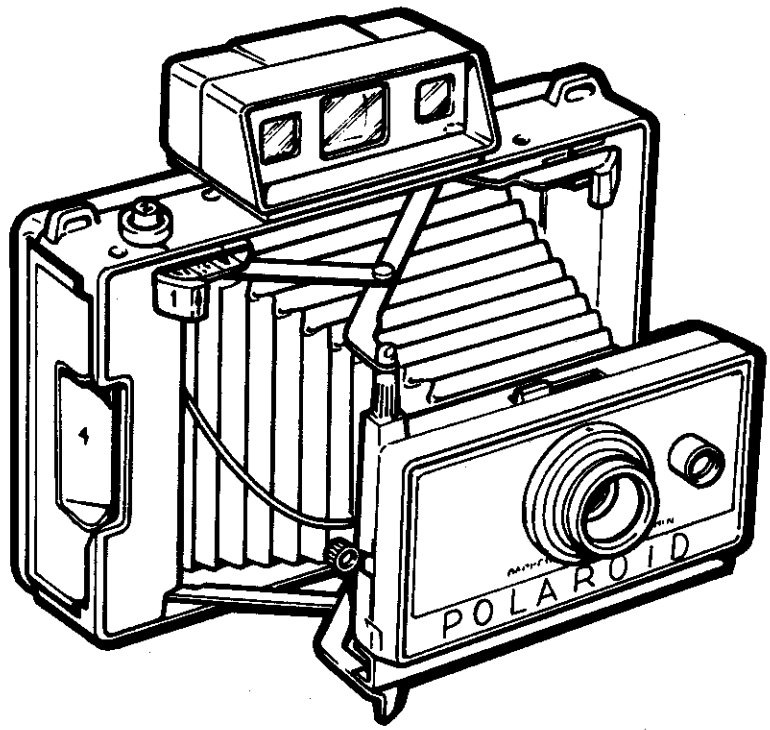

IMPORTANT:

The Guarantee does not cover cameras which have been tampered with, modified for special purposes, or repaired by any person or shop other than an approved Polaroid repair station.

POLAROID CORPORATION / CAMERA PRODUCTS SERVICES / WALTHAM, MASSACHUSETTS

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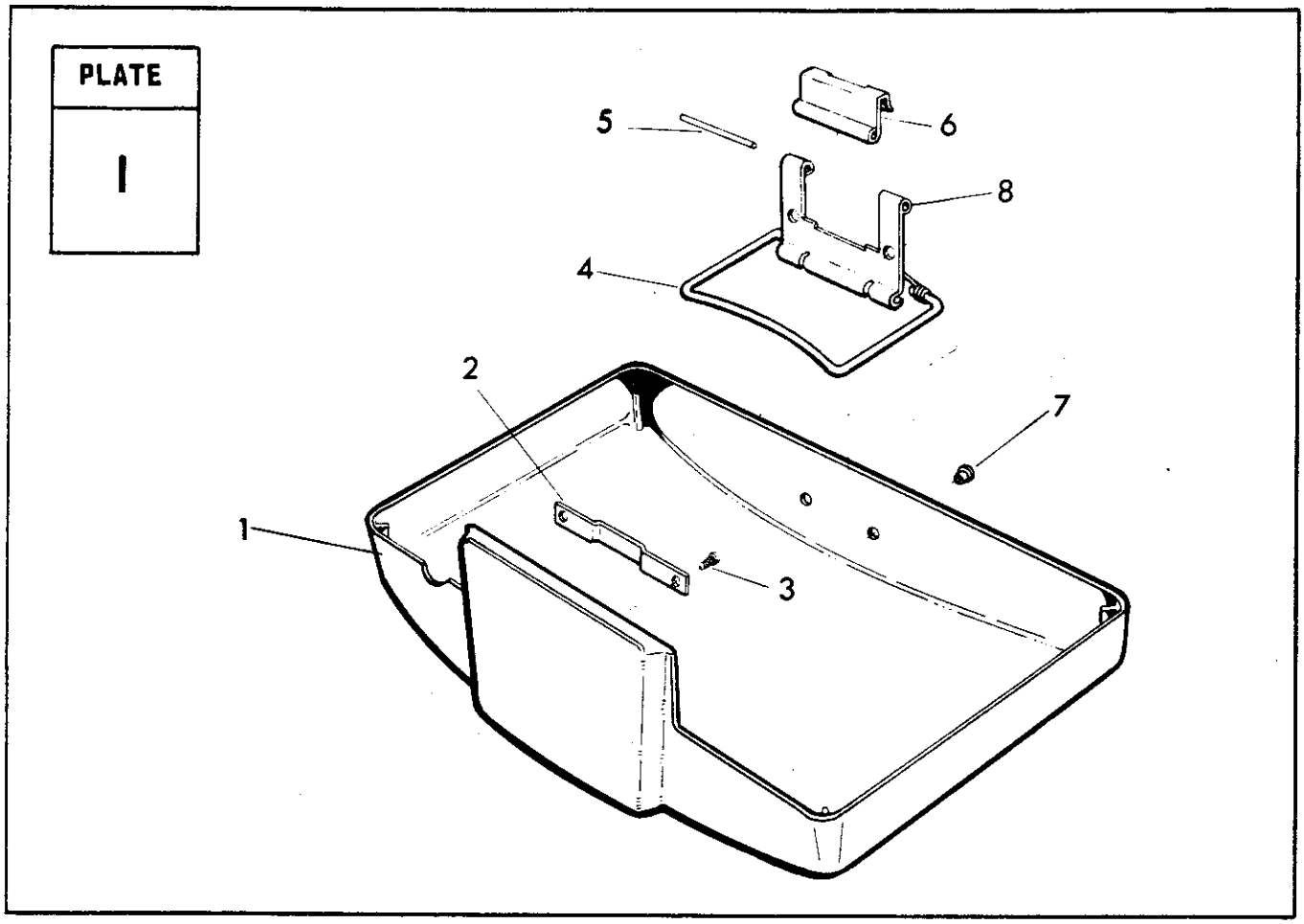
FRONT COVER ASSEMBLY



PARTS LIST I

FRONT COVER ASSY. (100 SERIES)

PART NUMBER BY CAMERA MODEL

Key No.	Part Name	100	101	102	103	104	125	135	Sugg. List Price
1	Front Cover Assembly	149762	155470	155479	163082	172619	181358	191096	
2	Latch Plate	160439	160439	160439	160439	——	——	160439	
3	Screw, Latch Plate (2)	160550	160550	160550	160550	——	——	160550	
4	Clip Spring Assy.	160549	160549	160549	160549	160549	160549	181271	
5	Mtg. Plate Hinge Pin	160450	160450	160450	160450	160450	160450	160450	
6	Mtg. Clip Hinge	157933	157933	157933	157933	157933	157933	157933	
7	Rivet, Mtg. Plate Hinge (2)	160449	160449	160449	160449	160449	160449	160449	
8	Mtg. Plate Hinge	157934	157934	157934	157934	157934	157934	157934	

FRONT COVER ASSY. (200 SERIES)

Key No.	Part Name	210	215	220	225	230	240	250	Sugg. List Price
1	Front Cover Assembly	204436	204406	204435	222367	204433	196574	163313	
2	Latch Plate	——	——	——	——	160439	160439	160439	
3	Screw, Latch Plate (2)	——	——	——	——	160550	160550	160550	
4	Clip Spring Assy.	181271	181271	181271	181271	181271	160549	160549	
5	Mtg. Plate Hinge Pin	160450	160450	160450	160450	160450	160450	160450	
6	Mtg. Clip Hinge	157933	157933	157933	157933	157933	157933	157933	
7	Rivet, Mtg. Plate Hinge (2)	160449	160449	160449	160449	160449	160449	160449	
8	Mtg. Plate Hinge	157934	157934	157934	157934	157934	157934	157934	

NUMERICAL PARTS LIST

PART NO.	PART NAME	100	101	102	103	104	125	135	210	215	220	225	230	240	250	SUGG. LIST PRICE
76121	Rivet	X	X	X	X	X	X	X	X	X	X	X	X	X	X	.04
76175	Rivet	X	X	X	X	X	X	X	X	X	X	X	X	X	X	.04
82760	Rivet	X	X	X	X			X			X	X	X	X	X	.04
121180	Screw, Release Arm	X	X	X	X	X	X	X	X	X	X	X	X	X	X	.04
121741	Rivet	X	X	X	X	X	X	X	X	X	X	X	X	X	X	.04
130501	Banding Clip	X	X	X										X	X	.04
132498	Shutter Mount	X												X	X	.66
146674	Release Latch	X	X	X	X	X	X	X	X	X	X	X	X	X	X	.39
146678	Exit Cover Plate	X	X	X										X	X	.22
146684	Zone Focus Plate	X	X	X	X			X			X	X	X	X	X	.09
146687	Stationary Hinge	X	X	X										X	X	.26
146688	Door Hinge	X	X	X	X	X	X	X	X	X	X	X	X	X	X	.26
146689	Shutter Release Knob	X	X	X	X	X	X	X	X	X	X	X	X	X	X	.44
146711	Etch Plate, Front Casting	X														.61
146722	Shutter Release Block	X	X	X	X	X	X	X	X	X	X	X	X	X	X	.09
146750	Right-Hand Guard	X	X	X											X	.18
146752	Rear Cover Latch	X	X	X										X	X	.09
146848	FOCUS BAR ASSEMBLY	X	X	X												3.14
146860	REAR DOOR ASSEMBLY	X	X	X			X							X	X	13.42
149516	Rivet, Detent Slide	X	X	X	X	X	X	X	X	X	X	X	X	X	X	.04
149517	Roll Bushing	X	X	X	X	X	X	X	X	X	X	X	X	X	X	.04
149520	Spring Stop	X	X	X										X	X	.04
149526	Hinge Pin	X	X	X	X	X	X	X	X	X	X	X	X	X	X	.04
149528	R.F. Body Spring	X	X	X	X			X					X	X	X	.09
149533	R.F. Window (Small)	X	X	X	X			X					X	X		.09
149538	Screw, Shutter Mount	X												X	X	.04
149542	R.F./V.F. Hinge Pin (Right)	X	X	X	X			X					X	X	X	.04
149543	R.F./V.F. Hinge Pin (Left)	X	X	X	X			X					X	X	X	.04
149545	"U" FRAME ASSEMBLY	X	X	X	X	X	X	X	X	X	X	X	X	X	X	.79
149547	Magnet Pivot	X	X	X	X			X					X			.04
149550	Track Guide	X	X	X										X	X	.04
149551	Return Spring	X	X	X	X	X	X	X	X	X	X	X	X	X	X	.04
149552	Link Pivot Spacer	X	X	X	X	X	X	X	X	X	X	X	X	X	X	.04
149553	Pivot Pin, Outer Frame (Bottom)	X	X	X										X	X	.04
149554	Spacer, Outer Frame (Top)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	.04
149556	Slot Cover	X	X	X										X	X	.13
149566	Detent Slide	X	X	X	X	X	X	X	X	X	X	X	X	X	X	.04
149567	Inner Frame (Top)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	.31

PART NO.	PART NAME	100	101	102	103	104	125	135	210	215	220	225	230	240	250	SUGG. LIST PRICE
149570	Screw, Shutter Shaft	X	X	X										X	X	.09
149571	Rangefinder Eye Window	X	X	X	X			X			X	X	X	X		.13
149574	Locating Spring, Edge Control	X	X	X	X	X	X	X	X	X	X	X	X	X	X	.04
149581	Link Pivot	X	X	X	X	X	X	X	X	X	X	X	X	X	X	.09
149584	Pole Piece	X	X	X	X			X					X			.09
149602	Focus Button (Left)	X	X	X	X	X	X	X								.18
149610	Rel. Arm	X	X	X										X	X	.18
149612	Rear Roll	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1.00
149613	Front Roll	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1.36
149709	R.F.-V.F. Band	X	X	X	X			X					X	X		.53
149710	R.F.-V.F. Pivot Pad	X	X	X										X	X	.09
149740	Cable Release Cover	X												X	X	.13
149755	Frame Roller Support	X	X	X	X	X	X	X	X	X	X	X	X	X	X	.61
149762	FRONT COVER ASSEMBLY	X														3.06
149766	Rear Door Spider	X	X	X	X	X	X	X	X	X	X	X	X	X	X	.79
149809	Center Ring	X	X	X									X	X	X	.13
149810	Outer Ring	X	X	X									X			.39
149811	Spring Seat	X	X	X												.09
149812	Screw, Bezel Retaining	X	X	X												.04
149813	Bezel Spring	X	X	X									X	X	X	.13
149817	Mounting Screw, Module	X	X	X										X	X	.04
149821	Dowel Pin	X												X	X	.04
149822	Screw, Shutter Fstg. (Long)	X	X	X										X	X	.04
149828	Screw, Shutter Fastening	X	X	X										X	X	.04
149829	Pivot Pin, Actuating Arm	X	X	X	X	X	X	X	X	X	X	X	X	X	X	.04
149831	Actuating Arm Spring	X	X	X										X	X	.04
149838	Rivet, Cell Wedge	X	X	X	X	X	X	X	X	X	X	X	X	X	X	.04
149865	Screw, Base Block Mtg.	X	X	X										X	X	.04
149870	Magnet	X	X	X	X			X					X			.13
152521	Release Block Retainer	X	X	X	X	X	X	X	X	X	X	X	X	X	X	.04
152525	Bezel Friction Spring	X	X	X	X	X	X	X	X	X	X	X	X	X	X	.04
153234	Bezel, Shutter Release	X	X	X										X	X	.18
153235	Spacer, Outer Frame (Bottom)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	.04
153307	SHUTTER ASSEMBLY	X														54.21
153308	SHUTTER FRONT CASTING ASSEMBLY	X														15.01
153310	SHUTTER REAR CASTING ASSEMBLY	X												X	X	8.05
153311	FLASH FILTER ACTUATOR ARM ASSEMBLY	X	X	X	X	X	X	X	X	X	X	X	X	X	X	.22
154046	Rear Lens Retainer	X												X	X	.09
154068	Lens, Positive	X	X	X	X			X			X	X	X	X		2.40
154069	Lens, Negative	X	X	X	X			X			X	X	X	X		2.40

PART NO.	PART NAME	100	101	102	103	104	125	135	210	215	220	225	230	240	250	SUGG. LIST PRICE
154071	Cell Lens	X	X	X	X	X	X	X	X	X	X	X	X	X	X	.13
154076	Scene Selector Button	X														.18
154556	Viewfinder Window	X	X	X	X			X			X	X	X	X		.13
154558	Washer, Focus Bar (Right)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	.04
154559	Focus Bar Bracket	X	X	X										X	X	.04
154560	Brake Sleeve	X	X	X	X	X	X	X	X	X	X	X	X	X	X	.04
154561	Sleeve, Focus Bar (Right)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	.04
154562	Brake Washer	X	X	X	X	X	X	X	X	X	X	X	X	X	X	.04
154563	Sleeve, Focus Bar (Left)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	.04
154564	Rivet, Focus Bar	X	X	X										X	X	.04
154565	Brake Rivet	X	X	X										X	X	.09
154575	INNER FRAME BOTTOM ASSY.	X	X	X										X	X	.31
154856	Cell Lens Mount	X	X	X										X	X	.09
154857	Cell Lens Retainer	X	X	X										X	X	.22
154870	Screw, Release Cover	X												X	X	.04
155106	Shutter Release Tip	X	X	X	X	X	X	X	X	X	X	X	X	X	X	.04
155115	Stud	X	X	X							X	X	X	X	X	.04
155116	Socket	X	X	X							X	X	X	X	X	.04
X155116	BATTERY TERM. ARM ASSY. (POS.)	X	X	X							X	X	X	X	X	.31
155117	SHUTTER RELEASE BUSHING ASSEMBLY	X	X	X	X	X	X	X	X	X	X	X	X	X	X	.31
155118	LIGHT SEAL ASSEMBLY	X	X	X										X	X	.83
155120	Brake Spring	X	X	X	X	X	X	X	X	X	X	X	X	X	X	.09
155121	Bushing, Focus Bar (Left)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	.04
155161	Retaining Ring	X	X	X	X	X	X	X	X	X	X	X	X	X	X	.04
155179	Wave Washer	X	X	X										X	X	.04
155212	Focus Button (Right)	X	X	X	X	X	X	X								.35
155235	FRONT LENS ASSEMBLY	X	X	X	X			X					X	X	X	6.83
155242	Lens, Rear Positive	X	X	X	X			X					X	X	X	2.18
155250	BATTERY WIRE ASSEMBLY	X	X	X										X		.57
155282	EXIT COVER FRAME ASSY.	X	X	X										X	X	2.14
155285	Battery, (4.5 Volt)	X	X	X							X	X	X	X	X	1.50
155287	Spread Roll Spring	X	X	X	X	X	X	X	X	X	X	X	X	X	X	.22
155316	LEFT HAND GUARD ASS'Y	X	X	X											X	.74
155317	BASE MOULDING ASS'Y	X						X					X	X		2.62
155318	REAR COVER ASSEMBLY	X	X	X								X		X	X	1.53
155320	REAR WINDOW PLATE ASSY.	X	X	X										X		.87
155321	Front Roll Support (Right)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	.13
155322	Front Roll Support (Left)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	.13
155330	SLIDE BLOCK ASSEMBLY	X	X	X	X	X	X	X	X	X	X	X	X	X	X	.26

PART NO.	PART NAME	100	101	102	103	104	125	135	210	215	220	225	230	240	250	SUGG. LIST PRICE
155331	Shutter Gasket	X	X	X							X	X	X	X	X	.09
155376	Cap Stop Bracket	X	X	X	X	X	X	X	X	X	X	X	X	X	X	.04
155426	Battery Clip	X	X	X										X	X	.13
155436	Left-Hand Guard				X	X	X	X								.31
155438	Exit Door				X	X	X	X	X	X	X		X			.22
155441	Stationary Hinge				X	X	X	X	X	X	X	X	X			.74
155470	FRONT COVER ASSEMBLY		X													3.06
155479	FRONT COVER ASSEMBLY			X												3.76
155485	VIEWFINDER FRONT ASSY.					X	X		X	X						2.18
155486	V.F. Rear Housing					X	X		X	X						.79
155492	Cam					X	X		X	X						.09
155494	Light Pipe					X	X		X	X						.22
155503	REAR DOOR SPIDER ASSY.	X	X											X	X	8.66
155551	SHUTTER REAR HOUSING ASSY.				X			X								5.82
155552	SHUTTER FRONT HOUSING ASSY.				X											10.94
155554	SHUTTER ASSEMBLY				X											43.36
155558	RF/VF ASSEMBLY				X			X								15.31
155579	BODY ASSEMBLY/BELLOWS	X	X	X												25.16
155586	SHUTTER REAR CASTING ASS'Y		X	X												4.94
155598	SHUTTER ASSEMBLY		X													54.21
157804	Strap Lug	X	X	X										X	X	.22
157809	Pivot, Spread Roll	X	X	X	X	X	X	X	X	X	X	X	X	X	X	.04
157821	Keeper	X		X		X	X		X		X			X	X	.04
157824	Tension Slide	X		X		X	X		X		X			X	X	.04
157830	Rivet, Rear Cover	X	X	X	X	X	X	X	X	X	X	X	X	X	X	.04
157837	Screw, Slide Block	X	X	X	X	X	X	X	X	X	X	X	X	X	X	.04
157838	Shaft	X	X	X	X	X	X	X	X	X	X	X	X	X	X	.04
157839	Link, Slide Block	X	X	X	X	X	X	X	X	X	X	X	X	X	X	.04
157841	Spring, Slide Block	X	X	X	X	X	X	X	X	X	X	X	X	X	X	.09
157842	Slide Plate	X	X	X	X	X	X	X	X	X	X	X	X	X	X	.09
157851	FLASH WIRE TAB ASSY.	X	X	X	X	X	X	X			X		X	X		.04
157857	Bushing, Shutter Mount	X	X	X	X	X	X	X	X	X	X	X	X	X	X	.04
157860	Rivet, Focus Button	X	X	X	X	X	X	X	X	X	X	X	X	X	X	.04
157866	Screw, Base Block Mtg. (Short)	X	X	X										X	X	.04
157869	Spring, Detent Slide	X	X	X	X	X	X	X	X	X	X	X	X	X	X	.04
157876	Rivet, Track Guide	X	X	X										X	X	.04
157877	Rivet, Spring Contact	X	X	X										X	X	.04
157887	Hinge Plug	X	X	X								X		X	X	.04
157894	Pivot Spring, Exit Door	X	X	X	X	X	X	X	X	X	X	X	X	X	X	.04

PART NO.	PART NAME	100	101	102	103	104	125	135	210	215	220	225	230	240	250	SUGG. LIST PRICE
157895	Pivot Stud, Exit Door	X	X	X	X	X	X	X	X	X	X	X	X	X	X	.04
157897	Rivet	X	X	X	X	X	X	X	X	X	X	X	X	X	X	.04
157899	Latch Pivot	X	X	X										X	X	.04
157904	Door Spring	X	X	X	X	X	X	X	X	X	X	X	X	X	X	.04
157915	Filler, Left	X	X	X	X	X	X	X	X	X	X	X	X	X	X	.04
157916	Filler, Right	X	X	X	X	X	X	X	X	X	X	X	X	X	X	.04
157918	BATTERY INTERLOCK ASSY.	X	X	X										X	X	.31
157919	Focus Bar Plate	X	X	X	X			X			X	X	X	X	X	.04
X157920	BATTERY TERM. ARM ASSY. (NEG.)				X	X	X	X	X	X	X	X	X			.31
157920	BATTERY TERM. ARM ASSY. (NEG.)	X	X	X										X	X	.31
157923	Spring, Mounting Plate	X	X	X	X	X	X	X	X	X	X	X	X	X	X	.31
157932	EXIT DOOR ASSEMBLY	X	X	X										X	X	.70
157933	Mounting Clip Hinge	X	X	X	X	X	X	X	X	X	X	X	X	X	X	.22
157934	Mounting Plate Hinge	X	X	X	X	X	X	X	X	X	X	X	X	X	X	.22
157939	Electronic Mounting Board Insulator	X												X	X	.04
157940	Top Etch Plate	X														.74
157949	Detent	X	X	X	X	X	X	X	X	X	X	X	X	X	X	.04
157992	Spring, Roll Frame	X	X	X	X	X	X	X	X	X	X	X	X	X	X	.04
160405	Battery Term. Arm (Neg.)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	.04
160406	Battery Term. Arm (Pos.)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	.04
160409	Eyelet	X	X	X	X	X	X	X	X	X	X	X	X	X	X	.04
160416	Spring, Release Latch	X	X	X	X	X	X	X	X	X	X	X	X	X	X	.04
160422	Magnet Spring	X	X	X	X			X					X			.04
160431	Center Retainer	X	X	X										X	X	.04
160439	Latch Plate	X	X	X	X			X					X	X	X	.04
160440	Flat Washer	X	X	X										X	X	.04
160442	Bowed Washer	X	X	X										X	X	.04
160449	Rivet, Mtg. Plate Hinge	X	X	X	X	X	X	X	X	X	X	X	X	X	X	.04
160450	Mounting Plate Hinge Pin	X	X	X	X	X	X	X	X	X	X	X	X	X	X	.04
160455	"D" Ring	X	X	X										X	X	.04
160460	Spring Washer	X	X	X	X	X	X	X	X	X	X	X	X	X	X	.04
160463	Cable Release Wire Tab	X	X	X	X	X	X	X			X		X	X		.04
160465	Screw, Tab Strip Bar	X	X	X										X	X	.04
160473	Detent Stud	X	X	X										X	X	.04
160532	Latch Pin	X	X	X	X	X	X	X	X	X	X	X	X	X	X	.04
160549	CLIP SPRING ASSEMBLY	X	X	X	X	X	X							X	X	.31
160550	Screw, Latch Plate	X	X	X	X			X					X	X	X	.04
160568	Circuit Light Seal	X	X	X							X	X	X	X	X	.04
160573	Neck Strap Band	X	X	X			X	X		X					X	.04
160591	Screw, Rear Cover Latch	X	X	X										X	X	.04

PART NO.	PART NAME	100	101	102	103	104	125	135	210	215	220	225	230	240	250	SUGG. LIST PRICE
161121	Roll Latch	X	X	X	X	X	X	X	X	X	X	X	X	X	X	.26
161130	Front Etch Plate				X											.39
161133	LIGHT SEAL ASSEMBLY				X	X	X	X	X	X	X	X	X			1.00
161135	NECK STRAP ASSEMBLY				X	X			X		X		X			.53
161137	Rear Cover Latch				X	X	X	X	X	X	X	X	X			.04
161138	Spring Stop				X	X	X	X	X	X	X	X	X			.13
161150	NECK STRAP ASSEMBLY		X													.70
161160	Rear Lens Mounting Plate		X	X	X			X					X			.13
161162	Erecting Bracket		X	X												.35
161171	Etch Plate, Front Casting		X													.44
161179	Etch Plate, Front Casting			X												.61
161185	Front Etch Plate					X										.39
161192	Torsion Spring					X	X		X	X						.04
162912	Rivet, Shutter Mount Spring	X	X	X	X	X	X	X	X	X	X	X	X	X	X	.04
162914	Screw, Battery Clip	X	X	X										X	X	.04
162940	Fastener, Left-Hand Guard	X	X	X										X	X	.04
163016	NECK STRAP ASSEMBLY	X		X										X	X	1.88
163068	Slider Decorative Plate				X	X	X	X								.09
163069	Front Lens Retainer				X			X					X			.04
163076	BATTERY WIRE ASSEMBLY				X	X	X	X								.57
163077	EXIT COVER FRAME ASSY.				X	X	X	X	X	X	X		X			1.66
163079	Rel. Arm				X	X	X	X	X	X	X		X			.09
163081	Battery (3 Volt)				X	X	X	X	X	X						1.25
163082	FRONT COVER ASSEMBLY				X											3.06
163085	Tab Strip Bar	X	X	X										X	X	.26
163114	Cable Release Cover				X	X	X	X	X	X	X		X			.09
163115	FOCUS BAR ASSEMBLY				X			X								2.49
163116	Shutter Gasket				X	X	X	X	X	X						.09
163117	REAR COVER ASSEMBLY				X	X	X	X	X	X						1.62
163118	REAR WINDOW PLATE ASSY.				X			X			X	X	X			.70
163120	REAR DOOR ASSEMBLY				X	X		X	X	X	X		X			12.47
163126	Bezel				X			X								.18
163151	Slide Block Cover	X	X	X	X	X	X	X	X	X	X	X	X	X	X	.31
163154	EDGE CONTROL BAR ASSY.	X	X	X	X	X	X	X	X	X	X	X	X	X	X	.79
163173	Cable Release Cover		X	X												.09
163193	Shutter Mount				X	X	X	X	X	X						.48
163198	Bezel					X	X		X	X	X	X				.13
163213	Positive Lens					X	X		X	X						.22
163253	Front Etch Plate									X						.53

PART NO.	PART NAME	100	101	102	103	104	125	135	210	215	220	225	230	240	250	SUGG. LIST PRICE
163259	Front Etch Plate						X									.48
163260	NECK STRAP ASSEMBLY						X	X		X		X				1.84
163261	Right-Hand Guard				X	X	X	X	X	X	X		X			.13
163301	Front Casting Light Seal	X	X	X										X	X	.04
163313	FRONT COVER ASSEMBLY														X	2.49
163314	Mirror Retaining Spring					X	X		X	X						.18
163327	V.F. FRONT ASSY. (METRIC)					X			X							2.27
168047	Screw, Shutter Fstg. (Long)				X	X	X	X	X	X	X	X	X			.04
168048	Screw, Shutter Fastening				X	X	X	X	X	X	X	X	X			.04
168049	Rivet, Shutter Mount				X	X	X	X	X	X						.04
168055	Screw, Shutter Mount				X	X	X	X	X	X	X	X	X			.04
168056	Detent Stud				X	X	X	X	X	X	X	X	X			.09
168057	INNER FRAME BOTTOM ASSY.				X	X	X	X	X	X	X	X	X			.31
168059	Slot Cover				X	X	X	X	X	X	X		X			.18
168060	Rear Door				X	X	X	X	X	X	X		X			1.40
168062	Stud				X	X	X	X	X	X						.04
X168063	BATTERY TERM. ARM ASSY. (POS.)				X	X	X	X	X	X						.31
168063	Socket				X	X	X	X	X	X						.04
168064	Hinge Plug				X	X	X	X	X	X	X		X			.04
168068	Brake Rivet				X	X	X	X	X	X	X	X	X			.04
168069	Rivet, Focus Bar				X	X	X	X	X	X	X	X	X			.04
168072	Repair Roll Bushing	X														.18
168080	Screw, Left-Hand Guard				X	X	X	X	X	X	X	X	X			.04
168082	Track Guide				X	X	X	X	X	X	X	X	X			.04
168083	Rivet, Track Guide				X	X	X	X	X	X	X	X	X			.04
168084	Pivot Pin, Outer Frame (Bottom)				X	X	X	X	X	X	X	X	X			.04
168091	Housing Nut				X	X	X	X	X	X	X	X	X			.04
168098	Shutter Shaft	X	X	X										X	X	.35
168099	Shutter Shaft Sleeve	X	X	X										X	X	.22
168185	Keeper, Neck Strap		X		X	X			X		X		X			.04
168188	Tension Slide		X		X	X			X		X		X			.04
170991	Top Etch Plate		X	X												.74
170992	Scene Selector Button		X	X												.35
172313	Rivet, Mtg. Plate		X	X	X			X					X			.04
172320	Shutter Mount Spring	X	X	X										X	X	.13
172331	Fastener, Bellows		X	X	X	X	X	X	X	X	X	X	X			.04
172381	Shutter Mount Spring				X	X	X	X	X	X	X	X	X			.13
172382	Latch Pivot				X	X	X	X	X	X	X		X			.04
172398	Retainer, Release Cover Screw		X	X	X	X	X	X	X	X	X	X	X			.04
172500	Screw, Release Cover		X	X	X	X	X	X	X	X	X	X	X			.04

PART NO.	PART NAME	100 101	102	103	104	125	135	210	215	220	225	230	240	250	SUGG. LIST PRICE
172501	Screw, Shutter Mount	X	X												.04
172509	Screw, V.F. Mtg. (Back)				X	X		X	X						.04
172528	V.F. Screw				X	X		X	X						.04
172531	Mirror Mask				X	X		X	X						.04
172616	Lens				X	X		X	X	X	X				.35
172619	FRONT COVER ASSEMBLY				X										2.84
172620	Dichroic Mirror				X	X		X	X						.70
172623	Lens Retainer				X	X		X	X	X	X				.04
172637	Metal Mirror				X	X		X	X						.22
172713	Baffle Plate				X	X		X	X						.04
172799	FOCUS BAR ASSEMBLY										X	X			2.14
172800	SHUTTER FRONT CASTING ASSEMBLY	X													14.66
172806	SHUTTER ASSEMBLY		X												54.21
172807	SHUTTER FRONT CASTING ASSEMBLY		X												16.41
172808	BODY ASSEMBLY/BELLOWS				X	X									14.83
172810	Negative Lens				X	X		X	X						.48
172811	VIEWFINDER ASS'Y				X	X		X	X						4.94
172813	SHUTTER FRONT HOUSING ASS'Y				X										3.76
172828	Viewfinder Front Housing				X	X		X	X						.31
172852	SHUTTER ASSEMBLY				X										32.55
172857	SHUTTER FRONT HOUSING ASSEMBLY					X									4.11
172858	SHUTTER ASSEMBLY					X									32.55
172887	V.F. ASSEMBLY (METRIC)				X			X							4.99
178040	Focus Bar Bracket			X			X			X	X	X			.04
178043	Retainer, Elect. Block			X	X	X	X	X	X	X	X	X			.04
178046	Rivet, Outside Prong			X	X			X		X		X			.04
178081	Spring, Actuating Arm			X	X	X	X	X	X	X	X	X			.04
178300	FOCUS BAR ASSEMBLY									X					2.14
178302	Fixed Mask				X	X		X	X						.13
178343	Moving Mask				X	X		X	X						.13
178361	FOCUS BAR ASSEMBLY				X	X									2.06
178471	Left-Hand Guard									X		X			.31
178589	SHUTTER FRONT CASTING ASSEMBLY						X								10.98
178590	SHUTTER ASSEMBLY						X								43.36
179708	Screw, Window Plate	X	X	X	X			X		X	X	X	X		.04
179729	Eyelet				X	X	X	X	X	X					.04
179730	R.F. Window (Large)	X	X	X	X			X				X	X		.09
179731	Bellows Front Frame Light Seal	X	X	X	X	X	X	X	X	X	X	X	X	X	.09

PART NO.	PART NAME	100	101	102	103	104	125	135	210	215	220	225	230	240	250	SUGG. LIST PRICE
179732	Bellows Light Seal	X	X	X	X	X	X	X	X	X	X	X	X	X	X	.09
181136	Neck Strap Band				X	X			X		X	X	X	X		.04
181251	Rivet, Outside Prong						X	X		X		X				.04
181254	Spacer					X	X		X	X						.04
181271	CLIP SPRING ASSEMBLY							X	X	X	X	X	X			.31
181322	Adjusting Spring					X	X		X	X						.18
181358	FRONT COVER ASSEMBLY						X									3.06
181514	Fixed Mask (Metric)					X			X							.13
181540	R.F.-V.F. ASSEMBLY														X	23.28
185640	Magnet Pivot														X	.35
188089	Pole Piece													X	X	.09
188090	Magnet													X	X	.13
188352	Front Etch Plate							X								.48
188375	Etch Plate, Front Casting														X	.39
188603	BODY ASSEMBLY/BELLOWS														X	24.68
188605	SHUTTER REAR CASTING ASSEMBLY												X			5.12
188609	SHUTTER FRONT CASTING ASSEMBLY														X	15.09
191096	FRONT COVER ASSEMBLY							X								3.06
195194	Magnet Spring													X	X	.04
195920	Right-Hand Guard													X		.26
196033	Slider Decorative Plate								X	X						.04
196034	Top Etch Plate										X	X	X	X	X	.26
196248	Scene Selector Button										X	X	X	X	X	.13
196372	FOCUS BAR ASSEMBLY													X	X	2.14
196378	BELLOWS ASSEMBLY								X	X		X			X	3.89
196438	Focus Button (Right)											X	X	X	X	.22
196439	Focus Button (Left)											X	X	X	X	.13
196574	FRONT COVER ASSEMBLY													X		2.71
196768	SHUTTER REAR CASTING ASSEMBLY						X	X	X	X						2.76
196769	SHUTTER ASSEMBLY									X						32.55
198774	SHUTTER ASSEMBLY														X	62.34
198844	Rivet, Shutter Mount										X	X	X			.04
204007	BATTERY WIRE ASSEMBLY														X	.44
204008	Cable Release Wire Tab								X	X		X			X	.04
204010	FLASH WIRE TAB ASSY.								X	X		X			X	.04
204091	Magnet Pivot													X		.09
204108	Shutter Mount										X	X				.44
204117	V.F. OPTICS ASSEMBLY	X	X	X	X			X			X	X	X	X		3.02
204134	FOCUS BAR ASSEMBLY								X	X						1.75
204157	LEFT-HAND GUARD ASSY.													X		.74

SECTION I - INTRODUCTION

This manual provides repair information on the optic and mechanical components of all automatic pack cameras in the 100, 200, and 300 lines. This manual, coupled with the two manuals referenced below, should provide all the information needed to repair any of the following cameras:

100 Line	200 Line	300 Line
100	250	360
101	240	350
102	230	340
103	225	335
104	220	330
125	215	320
135	210	315

Repair information on automatic shutters used in the pack cameras may be found in the "Repair Manual on Model 362, 366, and 374 Automatic Shutters" and in the "Repair Manual on the Model 360 Camera." (In addition, the latter manual covers repair procedures on the electronic flash, battery charger, and other items peculiar to that particular model.)*

This repair manual is structured as follows:
Section I is the introduction.

Section II contains the principles of operation for the film pack, spread system, focusing system, lenses, rangefinder/viewfinders, flashgun, and timers.

Section III presents a detailed visual checkout procedure which should be done for a stock or "re-do" camera brought in for repair. Also included in the section are testing procedures designed to verify proper operation of the shutter battery, shutter interlock, shutter release button, bellows, lenses, rangefinder/viewfinders, and timers.

Section IV is a compilation of troubleshooting charts. These charts list problems associated with pack cameras, their possible causes, and the suggested solutions.

Section V details the procedures to follow when adjusting or replacing any component of the automatic pack camera. Repair personnel are cautioned to note the differences among models when selecting these procedures.

Section VI is the parts identification section. It contains parts lists and exploded view drawings for all 100, 200, and 300 line cameras.

* These manuals are available only to authorized Polaroid repair stations.

PART NO.	PART NAME	100	101	102	103	104	125	135	210	215	220	225	230	240	250	SUGG. LIST PRICE
204194	SHUTTER FRONT HOUSING ASSEMBLY									X						4.11
204230	Etch Plate, Front Casting													X		.48
204231	Front Etch Plate												X			.48
204232	Front Etch Plate										X					.48
204233	Front Etch Plate								X							.48
204354	BEZEL ASSEMBLY													X	X	1.53
204366	Screw, V.F. Mtg. (Back)										X	X				.04
204394	Focus Button (Right)								X	X	X					.22
204395	Focus Button (Left)								X	X	X					.13
204397	Left-Hand Guard								X	X						.39
204398	BATTERY WIRE ASSY.								X	X						.53
204402	Lens, Rear Positive								X	X	X	X				.26
204403	Front Lens								X	X	X	X				.26
204406	FRONT COVER ASSEMBLY									X						2.06
204407	Outer Ring													X	X	.54
204408	BEZEL ASSEMBLY	X	X	X									X			1.31
204433	FRONT COVER ASSEMBLY												X			2.40
204434	BATTERY WIRE ASSEMBLY										X		X			.44
204435	FRONT COVER ASSEMBLY										X					2.32
204436	FRONT COVER ASSEMBLY								X							2.06
204501	BODY ASSEMBLY/BELLOWS													X		24.81
204502	SHUTTER ASSEMBLY													X		54.21
204503	SHUTTER FRONT CASTING ASSEMBLY													X		15.16
204504	BODY ASSEMBLY/BELLOWS												X			14.71
204505	SHUTTER ASSEMBLY												X			
204506	SHUTTER FRONT CASTING ASSEMBLY												X			11.33
204509	BODY ASSEMBLY/BELLOWS										X					16.12
204512	SHUTTER ASSEMBLY										X					43.36
204514	SHUTTER FRONT CASTING ASSEMBLY										X					3.34
204515	SHUTTER REAR CASTING ASSEMBLY										X					2.80
204516	BODY ASSEMBLY/BELLOWS								X	X						12.98
204517	SHUTTER ASSEMBLY								X							32.55
204520	SHUTTER FRONT CASTING ASSEMBLY								X							3.24
204762	REAR COVER ASSEMBLY										X		X			1.62
204763	Screw, V.F. Mtg. (Front)										X	X				.04
207060	R.F.-V.F. ASSEMBLY												X			9.41
207907	R.F.-V.F. ASSEMBLY										X					8.79
211469	Lens, Rear Positive				X			X					X			2.18
220117	Rear Door	X	X	X								X		X	X	1.72
220796	Cell Wedge	X	X	X	X	X	X	X	X	X	X	X	X	X	X	.13

PART NO.	PART NAME	100	101	102	103	104	125	135	210	215	220	225	230	240	250	SUGG. LIST PRICE
220958	Filter										X	X				.04
220968	Screw, Bellows	X												X	X	.04
221414	R.F.-V.F. ASSEMBLY													X		9.60
221466	BODY ASSEMBLY/BELLOWS	X	X	X								X				15.48
221468	SHUTTER ASSEMBLY											X				32.55
221469	R.F.-V.F. ASSEMBLY											X				9.10
221472	SHUTTER FRONT CASTING ASSEMBLY											X				3.72
221473	SHUTTER REAR CASTING ASSEMBLY											X				2.76
222073	Front Etch Plate											X				.44
222100	BELLOWS ASSEMBLY	X	X	X	X	X	X	X		X		X	X	X		3.89
222327	Right-Hand Guard											X				.18
222354	EXIT COVER FRAME ASSY.											X				1.66
222367	FRONT COVER ASSEMBLY											X				2.22
222403	REAR DOOR ASSEMBLY											X				12.80
222452	Shutter Mount												X			.53
222682	Exit Door											X				.22
222683	Release Arm											X				.09
222684	Cable Release Cover											X				.09
222686	Slot Cover											X				.13
222687	Latch Pivot											X				.04
222688	Left-Hand Guard											X				.44
222694	BATTERY WIRE ASSEMBLY											X				.44
252403	Shutter Mount	X												X	X	.70

SUPPLEMENT TO

REPAIR MANUAL

100-200-300 SERIES AUTOMATIC PACK LAND CAMERA

THIS SUPPLEMENT CONTAINS DESCRIPTIONS AND PROCEDURES UNIQUE TO THE 400-SERIES CAMERAS.

APRIL 1971

POLAROID CORPORATION / PARTS DEPARTMENT / WALTHAM, MASSACHUSETTS 02154

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A. INTRODUCTION

The 400 Series Automatic Pack Land Cameras are very similar to corresponding models in the 300 series. The most unique feature of the 400 line is the incorporation of the Focused Flash system. Minor differences exist in the camera focusing linkage to provide mechanical coupling to the gun. A few changes have been made to the physical appearance of the cameras, and a slight modification has been made to the shutter assembly.

With the exception of the flashgun repair procedures, the applicable paragraphs in the 300 series manual can be used to perform repairs on the 400 series cameras. This supplement contains detailed repair procedures for the model 490 flashgun. Illustrations and parts lists for the components unique to the 400 series are contained in a supplement to the 300 series Parts Catalogue. A separate supplement for insertion into the 362, 366 and 374 Shutter Repair Manual contains the 400 series shutter changes.

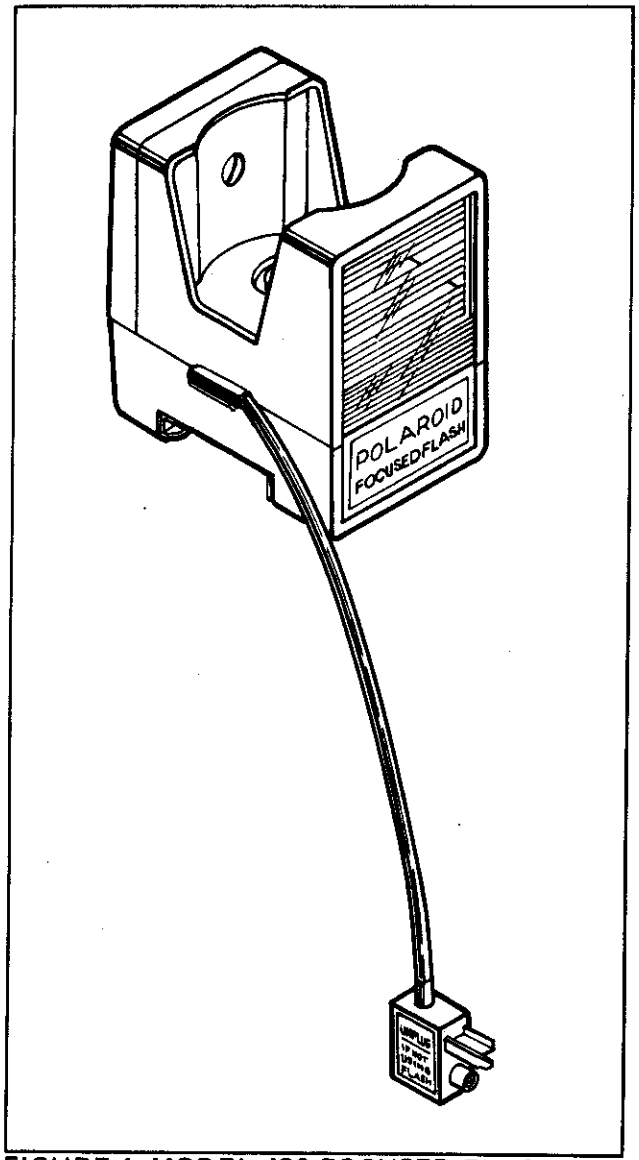


FIGURE 1 MODEL 490 FOCUSED FLASH

B. THE FOCUSED FLASHGUN (Figure 1)

The Model 490 Focused Flashgun has been designed to take advantage of the increased light output of the Hi-power flash cube. A set of moveable blinds are placed in front of the flash cube and mechanically coupled to the focusing linkage of the camera in such a way that the light from the flashgun is reduced as the camera approaches the subject (and is correctly focused) and an increase in light results as the camera focusing distance is increased up to approximately twenty feet.

Repairs and adjustments on the Model 490 Focused Flashgun are limited to checking and replacing batteries; and checkout, adjustment, and calibration of the moveable blinds.

C. BATTERY CHECK

1. Using a suitable coin, rotate the lock (behind the flash cube socket) one quarter turn in either direction.
2. Remove the rear cover.
3. Plastic tabs are provided to facilitate battery removal. Lift out the batteries.
4. Inspect the battery compartment for dirt or corrosion and clean if necessary.
5. Replace the batteries. Observe the polarity printed inside the flashgun.
6. Replace the rear cover and lock in place by rotating the lock one quarter turn.
7. Insert the special no-load dummy plug in the flashgun and plug the gun into the Universal Flashgun Tester. Set the tester on the 4.5 volt scale.
8. Set the toggle switch so that the meter needle reads up scale (proper polarity). The meter should indicate between 2.4 and 3 volts.
9. If the reading is less that 2.4 volts, replace the batteries and repeat the test.
10. If the reading is zero, there is an open circuit in the flashgun or the cord. Re-check the battery compartment for corrosion and repeat the test. If an open circuit is still indicated, replace the flash upper housing assembly.
11. If the 2.4 to 3 volt reading is obtained, push the LOAD button. The meter reading should drop a minimum of 2.4 volts. If the drop is greater than 2.4 volts, replace the batteries.

12. If the requirements of step 11 are met, remove the dummy plug and insert the 490 test flash bulb.
13. Push the flash button. The test flash bulb should light.
14. If the flashgun fails to meet any of the foregoing requirements, discard the flash upper housing assembly.

D. BLIND ADJUSTMENT CHECKOUT

The following special tools are required to perform blind checkouts and/or adjustments:

- Special 490 Stand, 11537.
- Specially calibrated pocket-type comparator 11536.
- Modified 490 lower housing assembly, 11540.
- Clip-on mirror attachment, 11541.
- Magnetized miniature hex nut driver, 11539.
- Special miniature square nut driver, 11538.

Check the blind setting as follows:

1. Open the clamp of the test stand (see Figure 2).
2. Slide the flashgun onto the camera-type pedestal at the top of the stand.
3. Push the flashgun onto the pedestal as far as it will go. A distinct click should be heard as the catch on the gun engages the slot in the pedestal.

   NOTE: A pin in the pedestal of the test stand engages the blind mechanism to establish a standard blind opening. This opening corresponds to a 6-foot camera setting. At this setting the open spaces between the blinds must be 0.159 plus or minus 0.010 inches, the spacing of the two scribed lines on the comparator reticle.
4. Slip the clip-on mirror attachment over the battery compartment of the flashgun so that the mirror comes to rest against the center pin of the flash cube socket (see Figure 2).
5. Place the pocket comparator on the upper surface of the flash window.
6. Rotate the comparator so that the specially scribed lines on the reticle are parallel with the openings in the blind.
7. Check the width of the blind openings against the scribed lines. The opening must be within plus or minus 0.010 inches of the scribed lines. If the opening is outside the tolerance, proceed with the adjustments described in the following paragraphs.

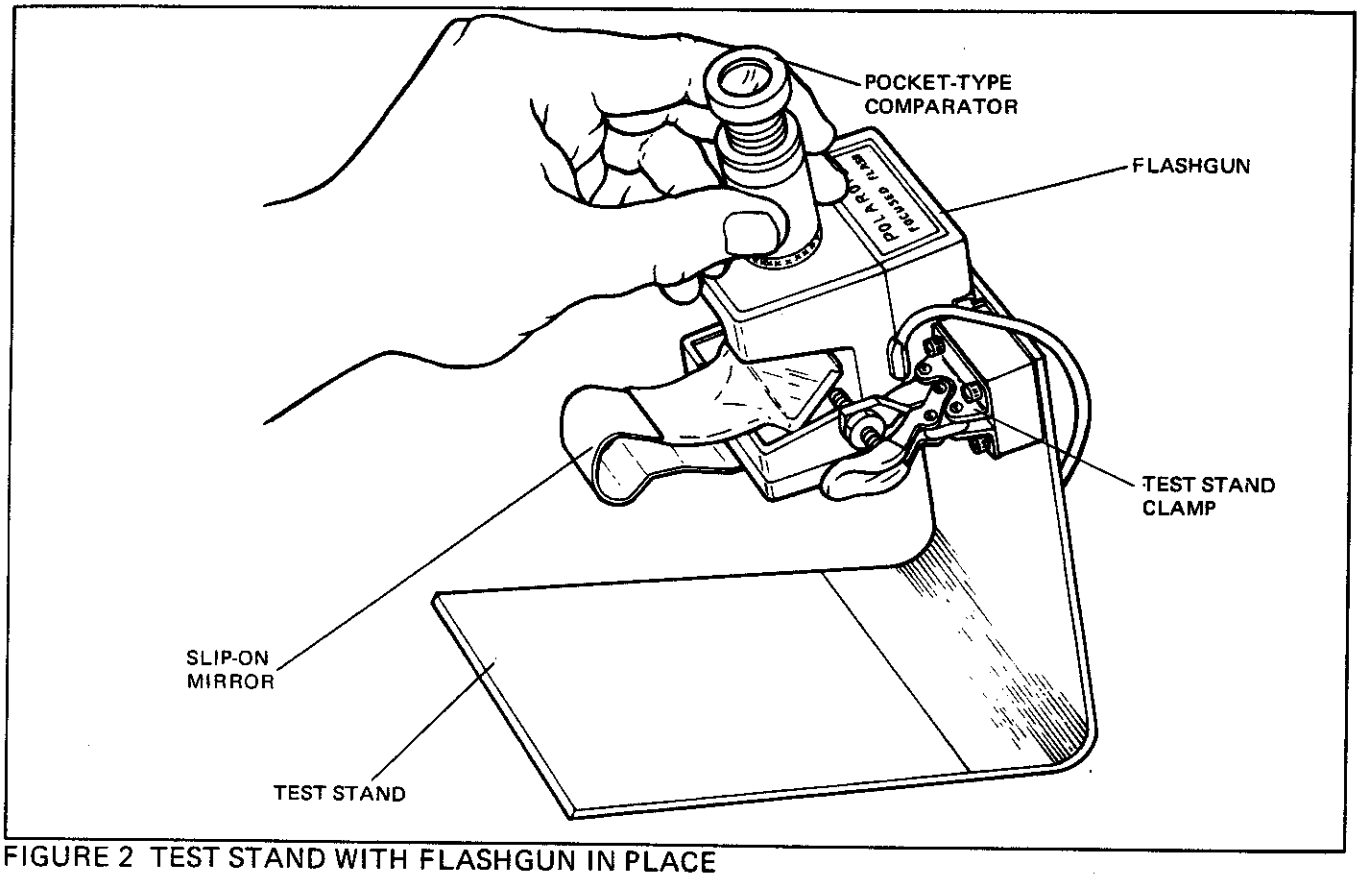


FIGURE 2 TEST STAND WITH FLASHGUN IN PLACE

E. BLIND ADJUSTMENT PROCEDURES

1. Using the magnetized miniature nut driver, remove the front (nearest the blind) screw adjacent to the flash cube socket.
2. Operate the cube rotating lever to expose the second screw, and remove the screw.

   NOTE: One screw is black and the other is bright plated. The screws must be returned to their original locations when the unit is reassembled. The screws are numbered 4 and 5 on Figure 3.
3. Lift off the flash upper housing assembly, item 3, Figure 3.
4. Remove the chassis assemblies (item 7) from the lower housing assembly (item 8).

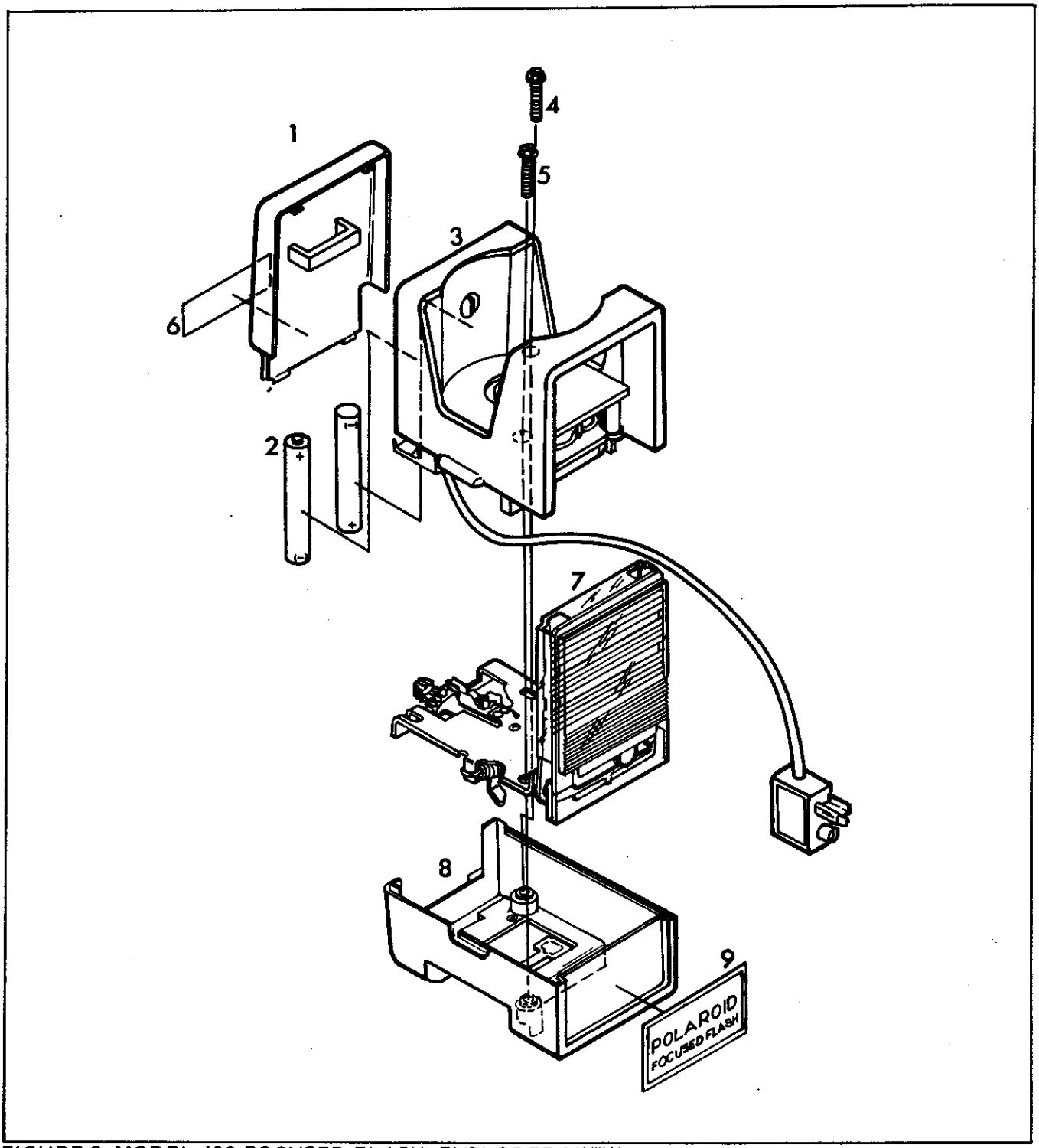


FIGURE 3 MODEL 490 FOCUSED FLASH, EXPLODED VIEW

SECTION II - PRINCIPLES OF OPERATION

THE FILM PACK

A description of the Polaroid Land pack camera should begin with an explanation of the operation of the film pack itself. The following description is applicable to both the black and white (Type 107) and the color (Type 108) film pack.

Figure 2-1 is a cross-sectional representation of a film pack loaded in the camera. The black safety cover which normally surrounds the negative and positive material has been removed, positioning the first white tab in the number 4 slot of the rear door assembly. The eight negatives, each with its own pod of developing jelly, are held in position by the spring-loaded pressure plate. On the other side of the pressure plate is the stack of eight positives. Both the negative and its corresponding positive is joined by a paper leader to a yellow tab. In turn, the yellow tab is connected to the white tab.

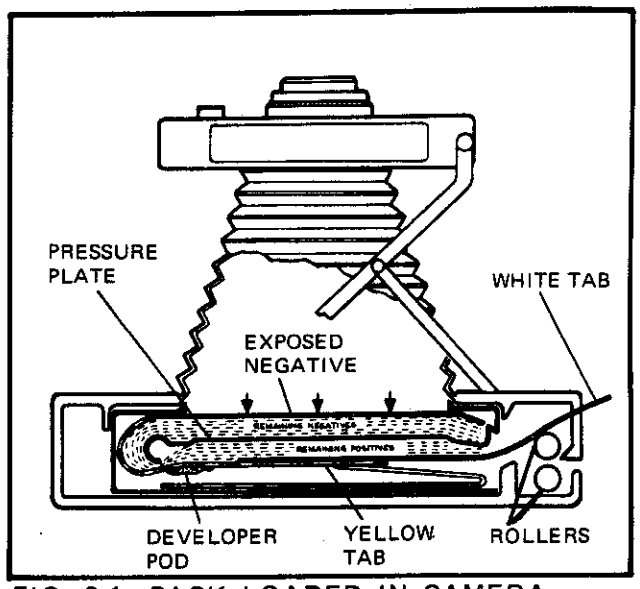


FIG. 2.1 PACK LOADED IN CAMERA

Pulling the white tab out of the camera (after the negative has been exposed) accomplishes two things as shown in Figure 2-2. (To simplify matters, the illustration shows only one negative and one positive.) First, it feeds the yellow tab between the rollers and out the door. Second, it pulls the exposed negative around the pressure plate so it faces the positive sheet. It should be stressed that pulling the white tab out of the camera does not start picture development. It simply places all of the picture assembly parts in the proper position for the next step.

To develop the picture, the yellow tab is pulled out of the camera as shown in Figure 2-3. This action bursts the pod on the negative. As the negative and positive are drawn through the rollers, an even coating of developing jelly is spread between the two sheets. The picture then develops outside the camera.

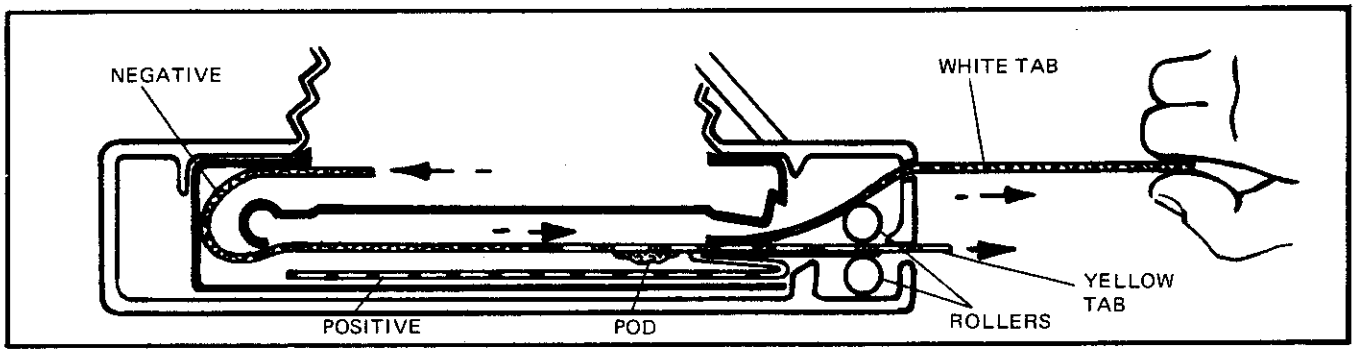


FIG. 2.2 WHITE TAB BEING PULLED

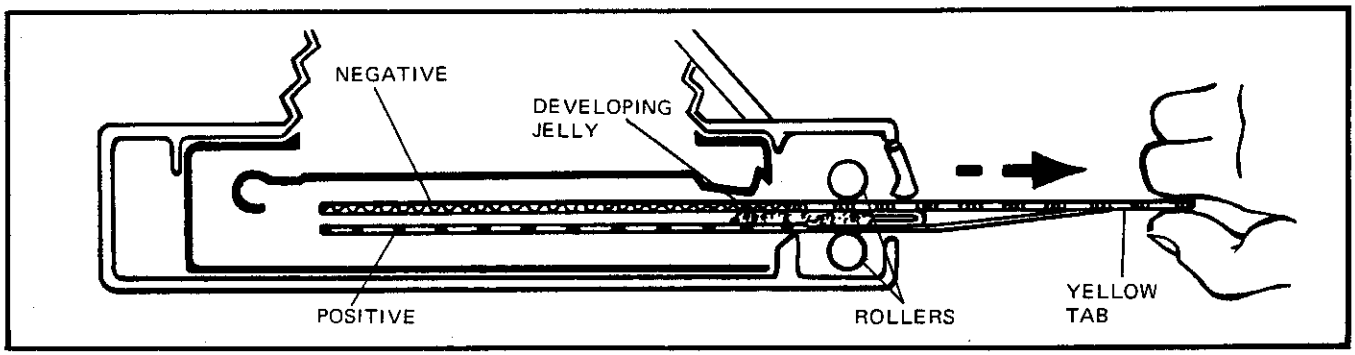


FIG. 2.3 YELLOW TAB BEING PULLED

5. Mount the chassis assembly into the modified lower housing included in the 490 tool kit. Make certain the chassis is firmly seated. The two plastic screw bosses must extend through the chassis plate so that the upper surfaces of the bosses are flush with the upper surface of the chassis plate.
6. On the chassis plate set the light/dark lever at its center position. The plastic knob must line up with the bronze detent spring.
7. Slide the modified lower housing onto the pedestal of the test stand as far as it will go.
8. Clamp the assembly into position with the test stand clamp (see Figure 4).

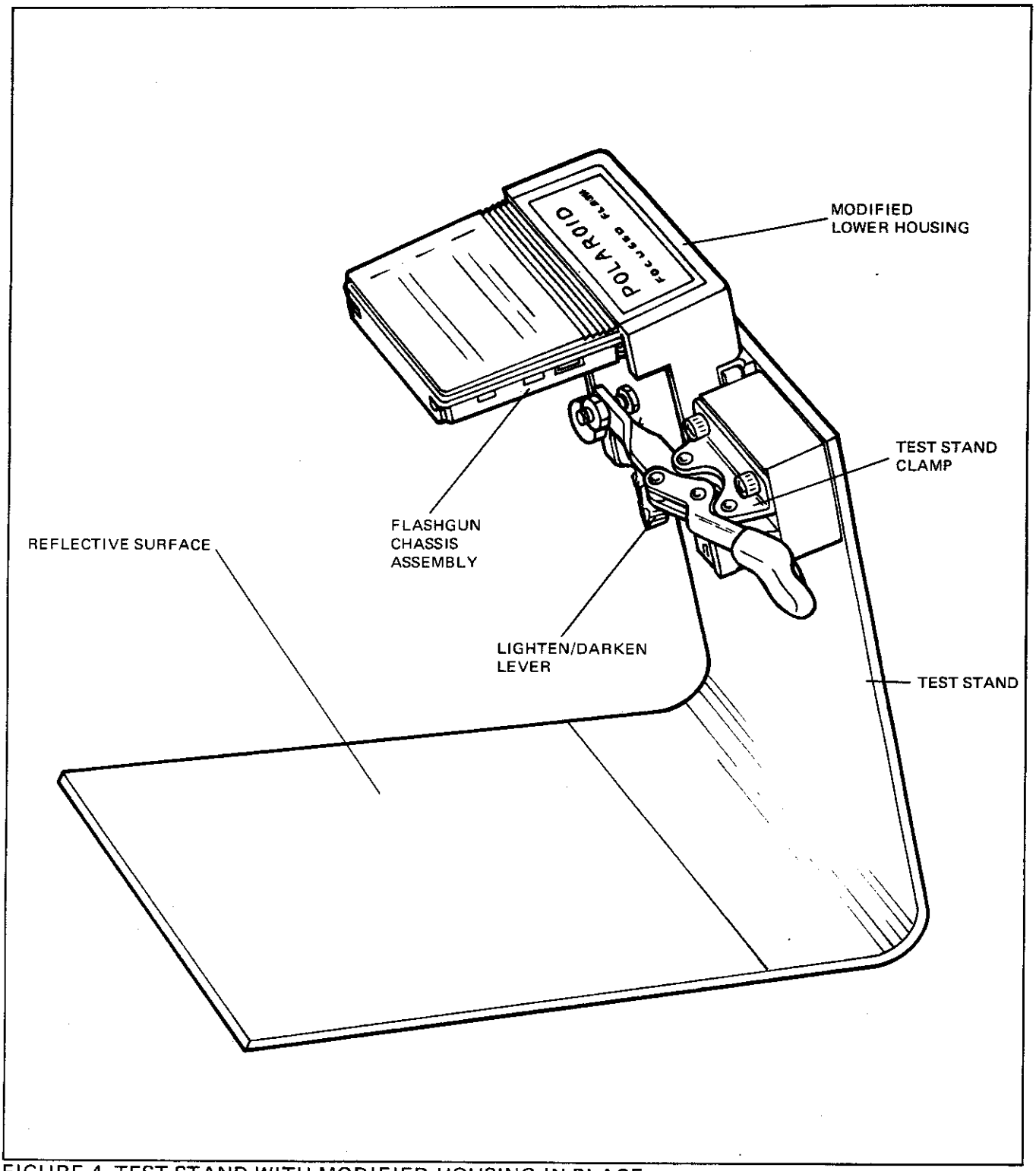


FIGURE 4 TEST STAND WITH MODIFIED HOUSING IN PLACE

9. Place the special miniature square nut driver in position on the blind adjusting screw. The screw can be observed through the circular opening in the test stand (see Figure 5).
10. Place the pocket comparator in position on the upper surface of the flash window and align the scribe marks with the blind openings.
11. Rotate the nut driver until the blind opening exactly matches the spacing of the two specially scribed lines on the comparator reticle. The flashgun is now correctly adjusted to the standard camera setting and will accurately track with the camera focusing mechanism.
12. Release the test stand clamp and slide the assembly from the pedestal.
13. Remove the chassis assembly from the modified lower housing.

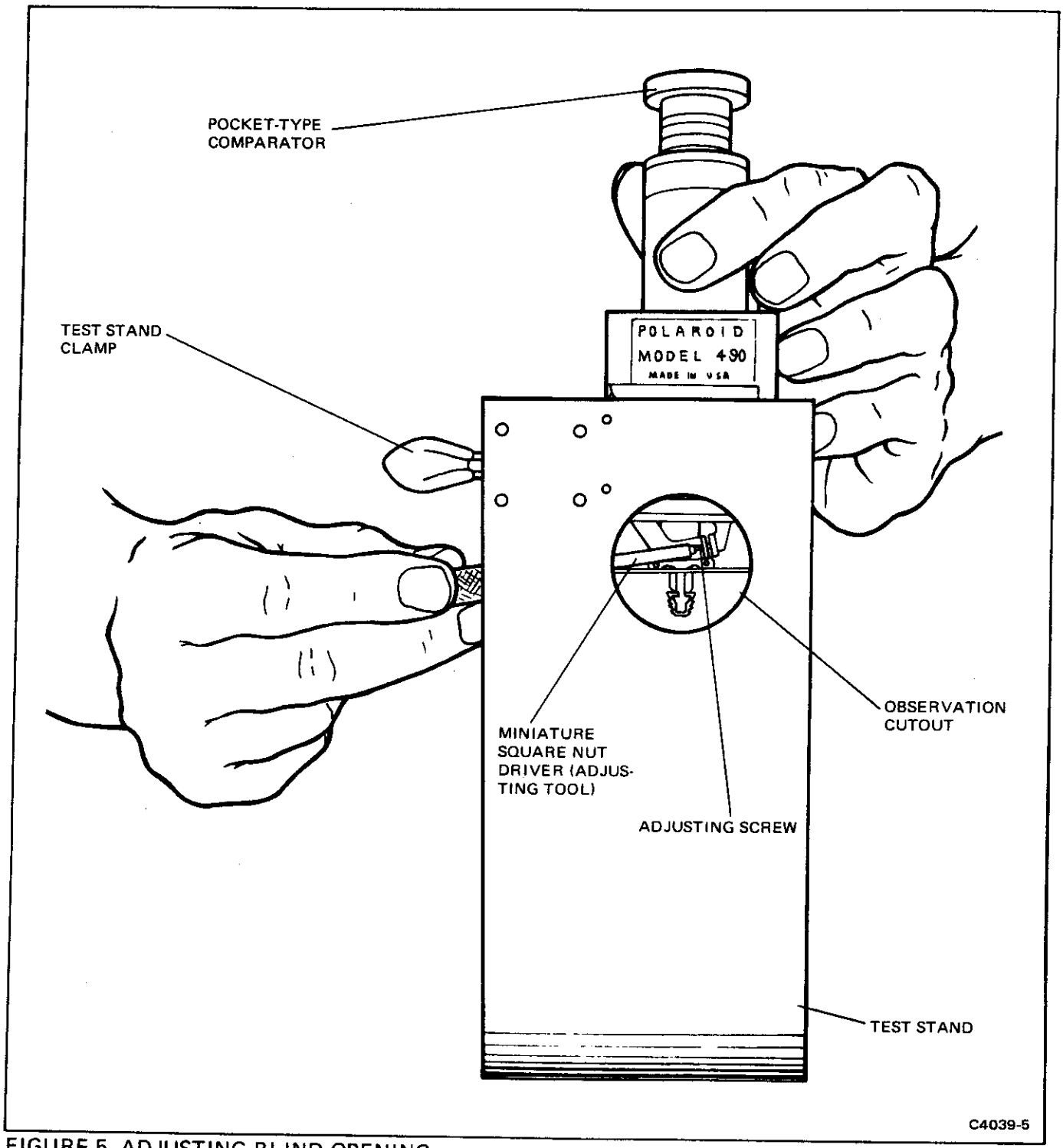


FIGURE 5 ADJUSTING BLIND OPENING

F. FLASHGUN ASSEMBLY PROCEDURES

1. Hold the flashgun lower housing upside down and guide the operating lever of the chassis assembly through the rectangular opening in the bottom housing.
2. Turn the assembly over and align the holes in the chassis with the two plastic screw bosses and the locating stud at the right rear corner of the lower housing.
3. Press down firmly until the upper surfaces of the plastic studs are flush with the upper surface of the chassis plate.
4. Pick up the upper housing and align the shutter cord in the curved groove in the projection at the side of the housing.
5. Slip the upper housing into place on the lower housing. Make certain that the shutter cord lies correctly in the two mating grooved projections and is not pinched between the upper and lower housings.
6. Press the upper and lower housing together so that the two are firmly mated.
7. Insert the black screw into the magnetized nut driver.
8. Install the black screw into the front (nearest the blind assembly) corner of the flashgun.
9. Operate the flash cube rotating lever and install the plated screw.
10. Tighten both screws.

THE SPREAD SYSTEM

The spread system works in conjunction with the film pack to process the negative and positive. The system, for our purposes, can be considered to consist of the rollers, the edge control bar and slide block assembly and the door spring (see Figure 2-4).

In Figures 2-1 through 2-3, the film pack is shown loaded in the camera. The action of the pressure plate keeps the top negative forced against the window of the pack. The door spring, in turn, keeps the entire pack forced against the body assembly. Thus, the pressure plate and the door spring working together, guarantee that the negative being exposed is at the appropriate focal plane.

The edge control bar and slide block assembly serve to funnel the yellow tab through the rollers. The slide block acts as a movable platform for the edge control bar which has both lateral and vertical movement. The bent fingers on the bar catch the tab and direct the film through the rollers in a straight line. (However, they cannot totally prevent bad spreads caused by film being pulled out of the camera at extreme angles.) The play in the edge control bar allows the assembly to move with the tab and thus avoids any ripping of film. Note that the top roller has a shoulder at either end. They provide for a separation which permits the tab to fit through the rollers. When the rollers are freed for cleaning, the sliding block moves the edge bar back out of the way.

The rollers themselves perform the vital function of evenly distributing the developing jelly between the negative and the positive. The film assembly is designed so that the sides of the negative and positive are tightly compressed by the rails while they are passing through the rollers. This prevents the jelly from being squeezed out the sides of the assembly (see Figure 2-5). When the jelly has been evenly spread over the entire length of the positive, the gap in the roller is increased by the traps on the film assembly. This permits the excess jelly to be trapped in the paper mask. Otherwise, the developing jelly would be squeezed completely out of the picture assembly and would be deposited in the roller area.

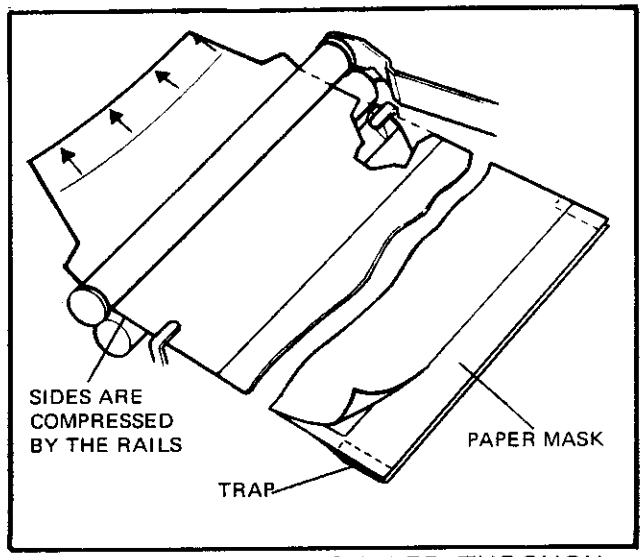


FIG. 2.5 FILM BEING PULLED THROUGH THE ROLLERS

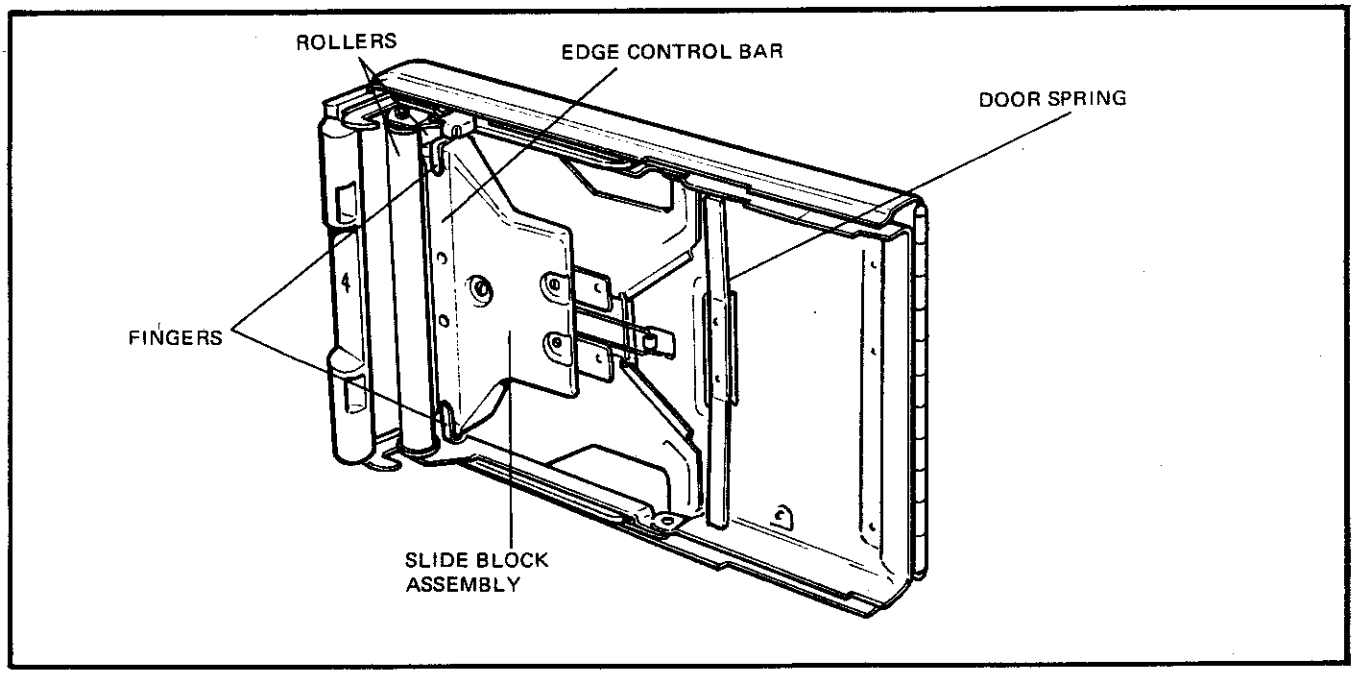


FIG. 2.4 VIEW OF REAR DOOR COMPONENTS

THE FOCUSING SYSTEM

The pack camera focusing system is controlled by the use of the two focus buttons shown in Figure 2-6. The linkage, consisting of the focus bar assembly, the inner frames and the U-frame, holds the shutter housing assembly (containing the lenses) in place.

When the right focus button is pushed, the focus bar assembly moves to the left and pulls the inner frame with it. The action of the linkage draws the shutter assembly toward the camera body, reducing the focal distance (lens-to-film distance). When the left focus button is pushed, the linkage reacts in the opposite manner and the shutter housing is moved away from the camera body, increasing the focal distance.

The focusing linkage controlling lens-to-film distance is mechanically coupled to the particular type of rangefinder/viewfinder used on the camera. A bracket on the focus bar is tied to a pick-up cam in the rangefinder/viewfinder. The movement of the cam adjusts the rangefinder/viewfinder. When the image is in proper focus according to the rangefinder/viewfinder (or when the proper distance is shown in the rangefinder), the lens is automatically set at the right focal distance.

On some cameras, a fast focus decal is mounted on the focus bar assembly. When the focus buttons are moved, the decal slides past an indicator on the camera body. Fiducial marks on the decal are lined up with the indicator to approximate distances from the camera to the subject.

LENSES

There are two types of lenses used in the pack camera. The following models use a two element (duplet) molded plastic lens:

Model 104
Model 125
Model 210
Model 215
Model 220
Model 225
Model 315
Model 320

Glass triple element (triplet) lenses are used in these models:

Model 100	Model 230	Model 340
Model 101	Model 240	Model 350
Model 102	Model 250	Model 360
Model 103	Model 330	
Model 135	Model 335	

Both duplet and triplet lenses have similar characteristics. They are f/8.8 color-corrected lenses

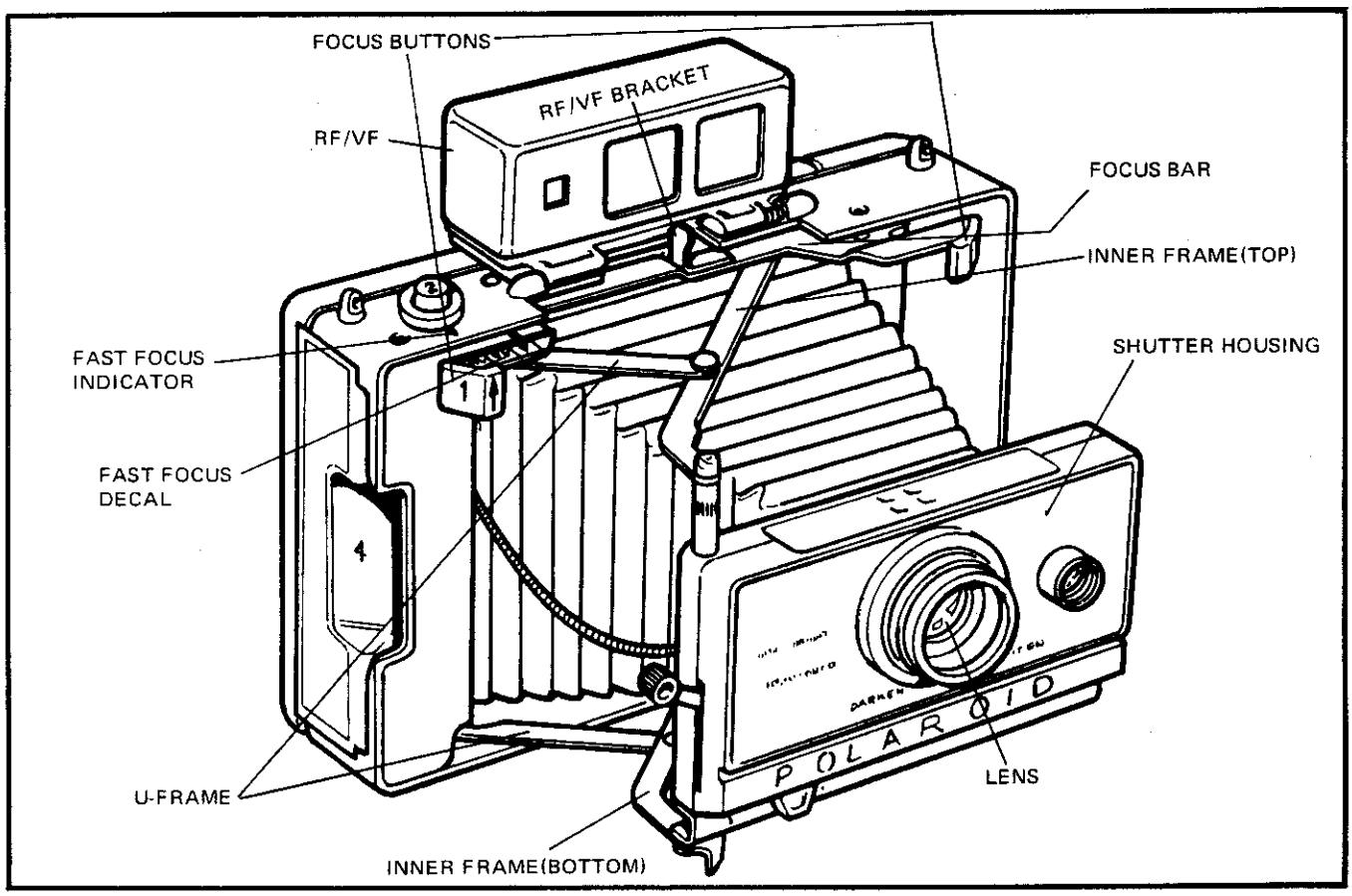


FIG. 2.6 FOCUSING COMPONENTS

with focal lengths of 114 millimeters. At f/8.8 (the color setting), the hyperfocal distance (the near limit of the sharp field when the camera is focused to INFINITY) is 42 feet. At f/42 (the black and white setting), the hyperfocal distance drops to 8 feet. The diagonal field of view is 55°, while the angular field (at INFINITY) is 36° X 46°.

RANGEFINDERS/VIEWFINDERS

There are three types of rangefinders/viewfinders used in Polaroid Land automatic pack cameras. The first, is a relatively simple image sizer which frames the subject and provides a scale for estimation of distance between camera and subject. The second model is a true rangefinder/viewfinder which focuses by superimposing two images of the subject. Separate windows are provided for the focusing and framing functions. The third type is the Zeiss Ikon model which also focuses by superimposing two images. However, both the focusing and framing images are viewed through a single window.

Image Sizer

The image sizer is used on the Model 104, 125, 215, 210, and 315 cameras. Figure 2-7 shows the internal construction of the image sizer.

The subject is projected to the eye lens through the translucent dichroic mirror. (As used in Polaroid cameras, a dichroic mirror can be defined as an optic device which reflects an image, imparting to it a certain color characteristic, while it allows another image to pass through it in its natural colors. For example, Figure 2-7 shows incident light being reflected off one side of the dichroic mirror before it reaches the eye. The incident light takes on the color of the mirror - either purple or amber. At the same time, the scene light passes through the mirror to the eye in its natural colors. In this way, Albada lines framing the subject can be contrasted against natural scene light.) When viewed, the subject is outlined by a frame of small diamonds. The diamonds are the result of incident light shining through the mask assembly (which forms the diamonds) and then reflecting off the metal mirror and the colored side of the dichroic mirror. The distance scale, fixed horizontal line, and movable arrow are brought to the eye lens in the same way.

As the camera is focused, the mask assembly moves in such a manner that the area encompassed by the diamonds is either enlarged or reduced. In coincidence with this, the arrow moves

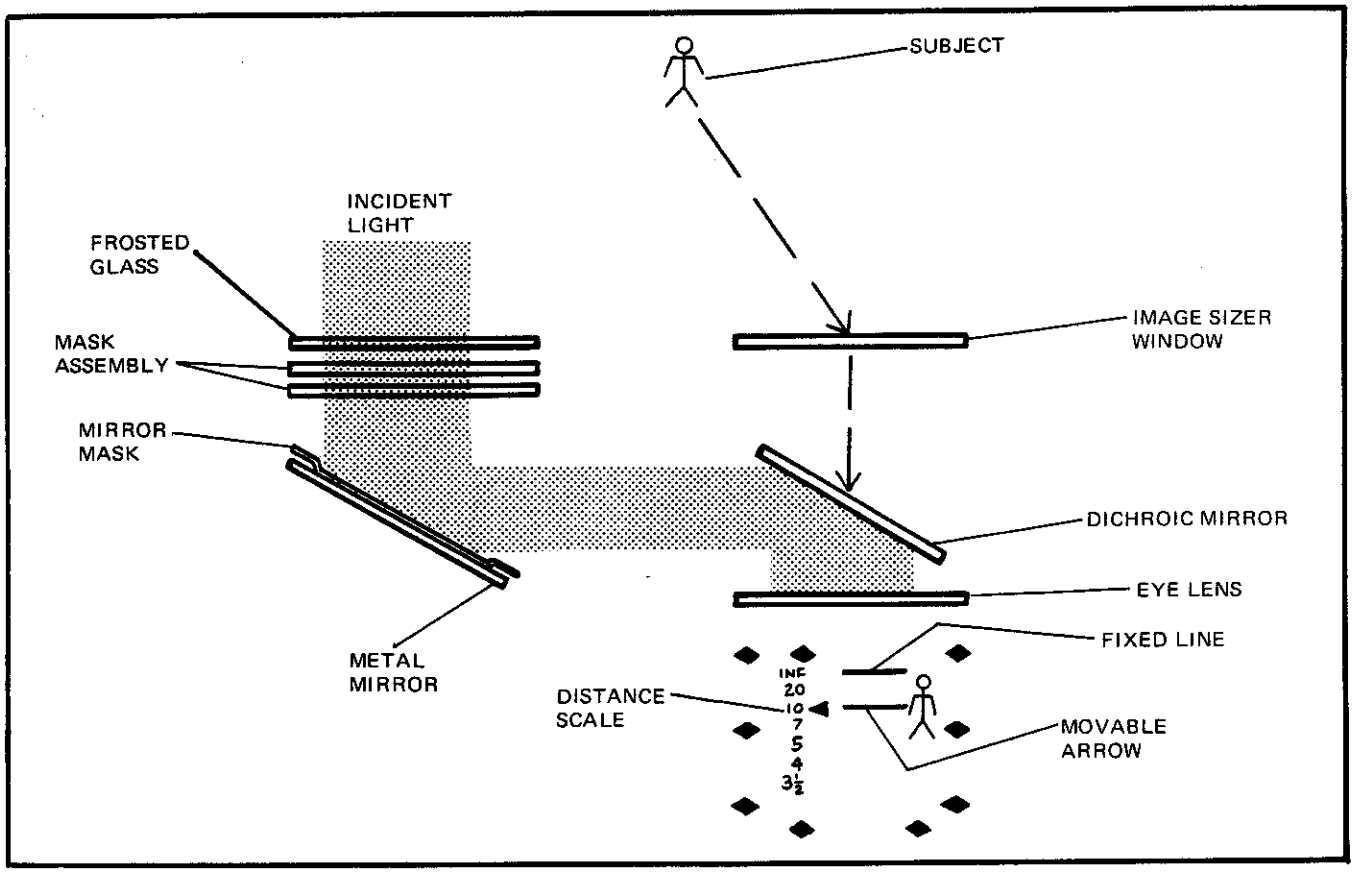


FIG. 2.7 IMAGE SIZER INTERNAL CONFIGURATION

up or down, pointing to the increments of the distance scale. When the arrow is at the distance mark estimated as being the actual distance between camera and subject, the diamond frame is adjusted to include only that area which will be visible in the finished print. The coupling between the image sizer and shutter housing guarantees that the lens will be set at the appropriate distance from the film plane.

Two methods can be employed when using the image sizer. The distance between camera and subject can be estimated beforehand and the focus buttons adjusted until the movable arrow is set at the corresponding figure on the scale. For many shots, the second method can be used. This requires that the subjects' face be framed between the fixed line and the movable arrow. To do this, the fixed line is set at the top of the subjects' forehead and the focus buttons are adjusted until the movable arrow is set at the bottom of the chin. (With small children, the entire head should be framed.) When this is done, the camera should be properly focused for that particular shot.

Polaroid Rangefinder/Viewfinder

The Polaroid rangefinder/viewfinder (RF/VF) is used on the greatest number of models in the automatic pack camera line. In the Model 100, 101, 102, 103, 135, 240, 230, and 340 cameras, the RF/VF can be folded down when the unit is not being used. In the Model 225, 220, 335, 330, and 320 cameras, the RF/VF cannot be folded. However, both types of RF/VF models operate in the same way.

Viewfinder (See Figure 2-8)

The image projected to the viewfinder eye window comes directly through the optics assembly from the viewfinder window. The optics assembly consists of negative and positive lenses. Albada lines, which are used to frame the subject, are painted on the positive lens. The entry of incident light reflects these lines off the negative lens. The reflection of the lines is what is actually visible in the viewfinder eye window. As the camera is focused, the entire optics assembly tilts, causing the Albada line frame to move. Focusing

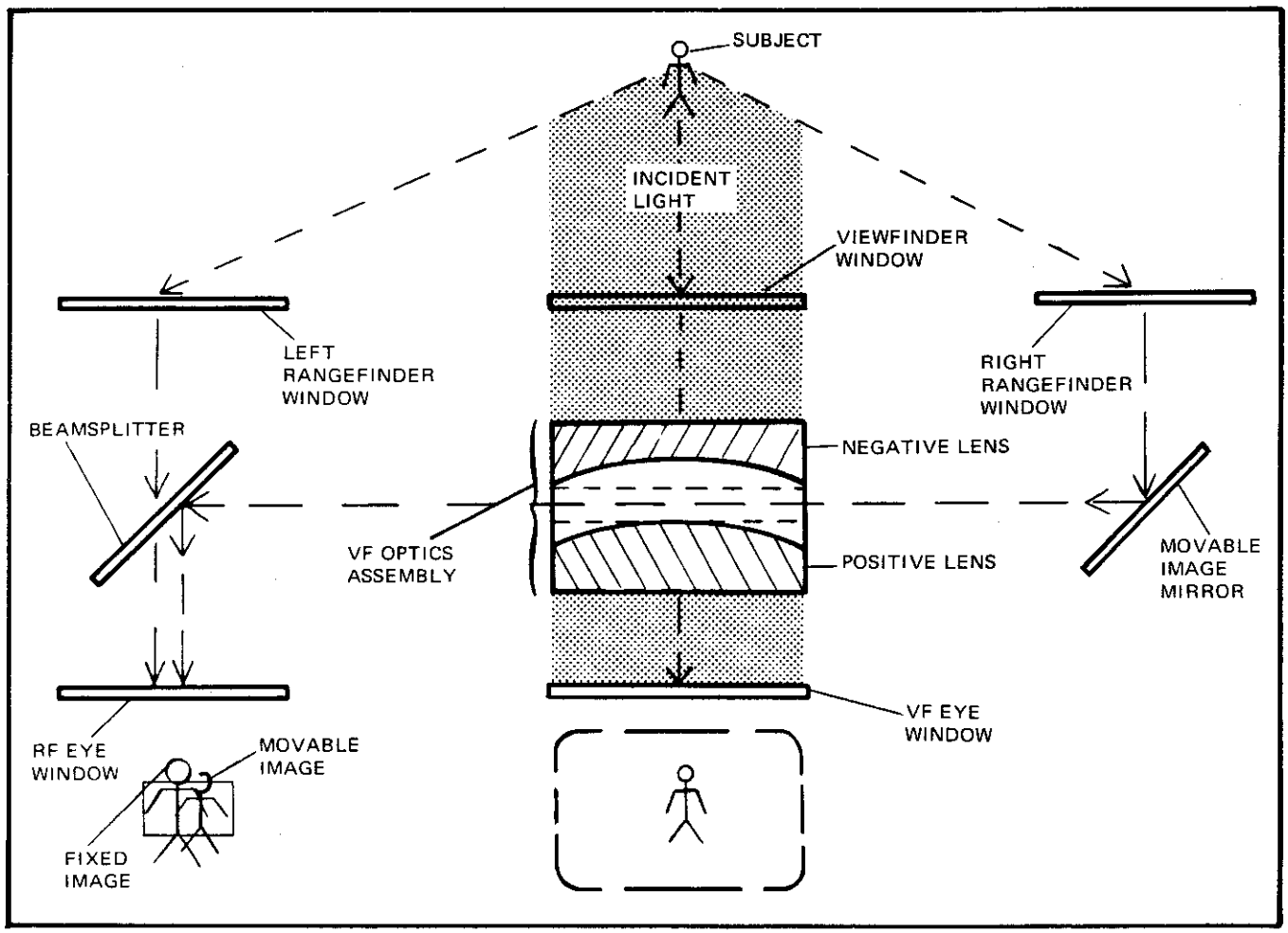


FIG. 2.8 POLAROID RANGEFINDER/VIEWFINDER INTERNAL CONFIGURATION

from INFINITY to CLOSE-UP, for example, moves the frame downward. (For extreme CLOSE-UP shots, it is necessary to allow a little extra space between the subject and the top frame line because the optics assembly cannot tilt enough to compensate properly.)

Rangefinder

When looking through the rangefinder eye window (when the camera is out of focus), two images are seen in the small amber or purple square. (In some cameras, this may be a circle.) These images result from the ability of the beamsplitter to have light transmitted through it while simultaneously having light reflected from it. This property allows the viewer to observe one image superimposed upon another image. The beamsplitter also has dichroic characteristics which impart color to the reflected image. One of these images, the fixed image, comes directly from the left rangefinder window and is transmitted through the beamsplitter to the eye window. The second image, the movable image, is channeled through the right rangefinder window to the movable image mirror which reverses it. The image is reflected through an opening in the optics assembly and it strikes the beamsplitter which reverses it again. From the beamsplitter, the image is reflected to the rangefinder eye window.

Focusing the camera pivots the movable image mirror through a small arc. This movement shifts the image left or right on the beamsplitter. When the movable image merges with the fixed image, the camera is properly focused.

Zeiss Ikon Rangefinder/Viewfinder

The Zeiss Ikon rangefinder/viewfinder is a single window, projected frame, superimposed image finder. It is used on the Model 250, 350, and 360 cameras.

Viewfinder

Figure 2-9 shows the internal construction of the Zeiss Ikon rangefinder/viewfinder. Starting with the viewfinder portion of the assembly, the fixed image on the eye lens can be seen to be formed by the projection of the image through the objective lens and the beamsplitter.

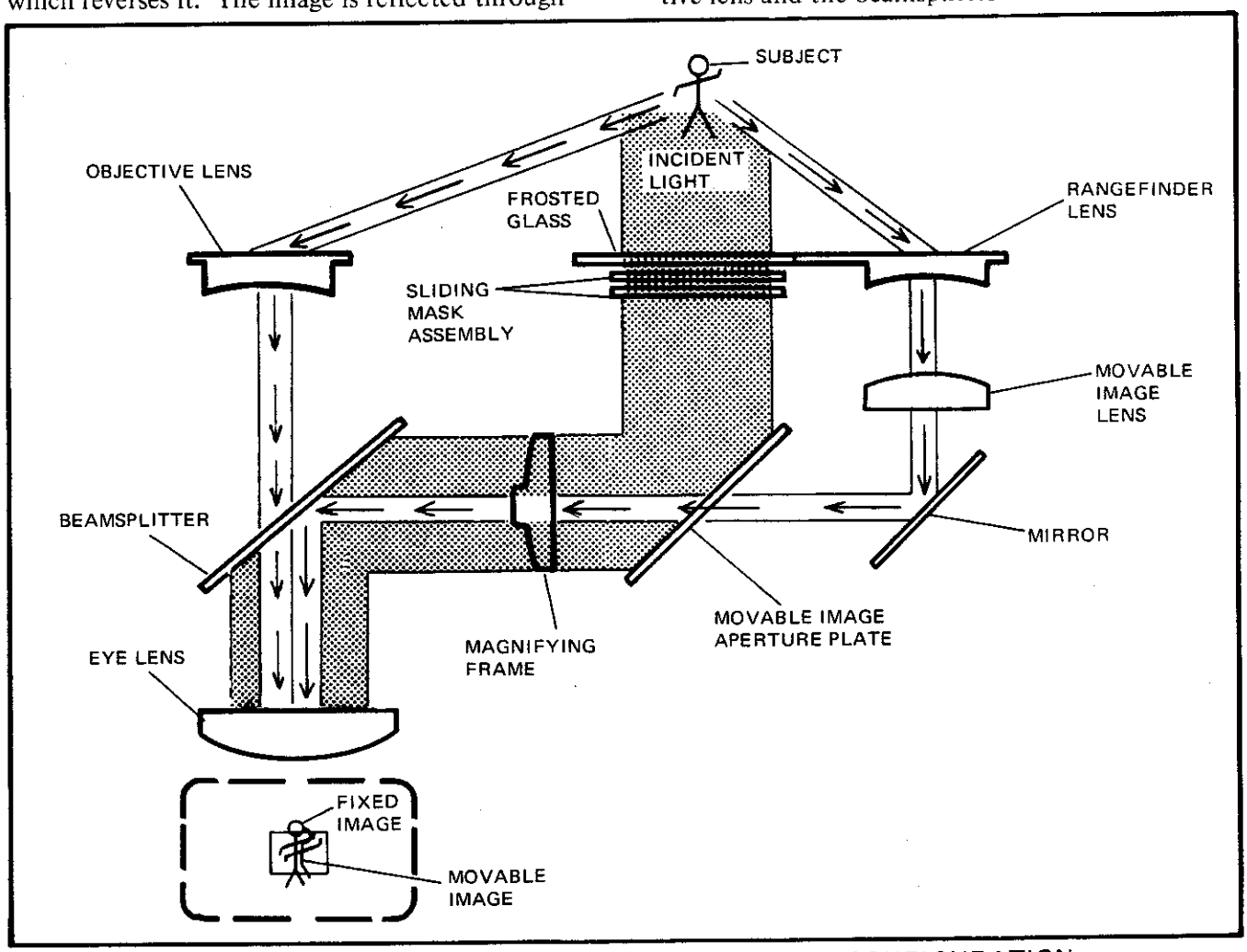


FIG. 2.9 ZEISS IKON RANGEFINDER/VIEWFINDER INTERNAL CONFIGURATION

The Albada line (the dotted amber line which frames the fixed image) results from incident light passing through the frosted glass and the sliding mask assembly. The assembly consists of two masks linked together and tied to the focusing bar. As the camera is focused from infinity to close-up, the sliding mask moves and causes the Albada line to contract, compensating for the reduced image area. The incident light projects the Albada line to the movable image aperture plate and it is then reflected through the magnifying frame to the beamsplitter. The dichroic characteristic of the beamsplitter gives the Albada line its amber color as it passes it to the eye lens.

Rangefinder

Simultaneous with the projection of the image through the objective lens, is the projection of the image through the rangefinder lens. Where the image from the objective lens is a real fixed image, the image coming from the rangefinder lens differs in that it is movable from left to right.

The rangefinder image is sent to the eye lens as follows:

1. The rangefinder lens and the movable image lens invert the image and pass it through the mirror.
2. The mirror reverses the image and projects it through the opening in the movable image aperture plate to the center of the magnifying frame.
3. Passing through the center of the magnifying frame, the image is inverted again and is projected onto the beamsplitter.
4. At the beamsplitter, the image is reversed again and takes on the amber color seen in the eye lens.

This movable rangefinder image occupies a small amber-colored square superimposed in the middle of the fixed image.

Shifting of the image is accomplished by focusing the camera. As the focus bar moves, it sends the movable image lens through a very small arc. This movement causes the image striking the mirror to shift left or right. When the movable image merges with the fixed image, the camera is in proper focus.

TIMERS

With the introduction of the 300 line, timers were made an integral part of some pack cameras. The Model 330 and 340 cameras feature a mechanical timer, while the Model 335, 350, and 360 cameras have electronic timers.

Mechanical Timer (Models 330 and 340)

The mechanical timer is a spring-driven device designed to measure elapsed time. Figure 2-10 shows how the timer is set into the rear door assembly. To help in understanding how the timer works, think of it as being composed of three parts: the start button, the timing ring, and the spring-driven gear assembly.

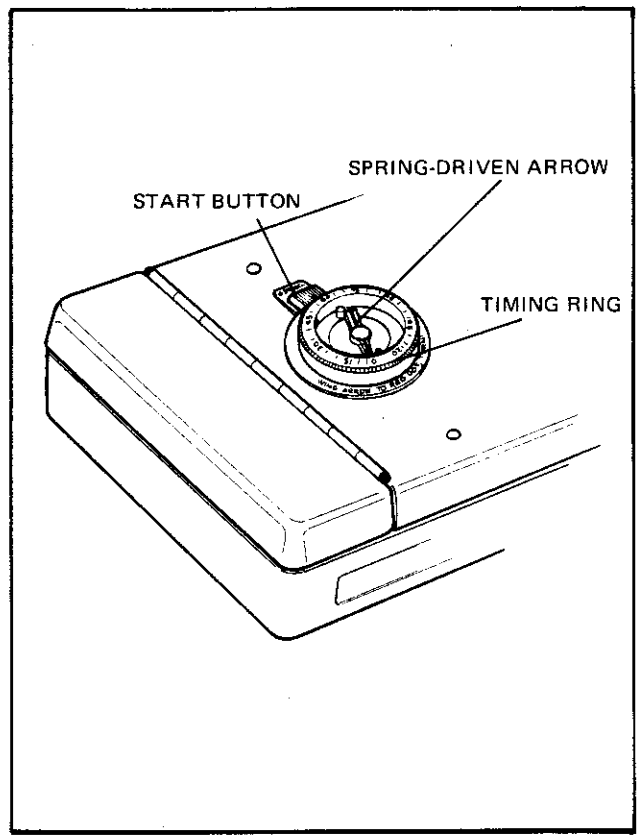


FIG. 2.10 MECHANICAL TIMER

The first step taken to operate the timer is to wind the arrow until it points to the red dot in the start button. Second, the timing ring is pushed in and then turned until the desired time is set under the red dot. Third, the start button is pushed to the left. What these operating procedures actually do can be explained by examining Figure 2-11.

When the arrow is turned, the mainspring inside the timer is being wound. The action of the spring, while it unwinds, drives the arrow around. You can see that the spring is also linked to a series of gears. In addition to controlling the unwinding of the mainspring, the purpose of the gears is two-fold. One, they provide the sound

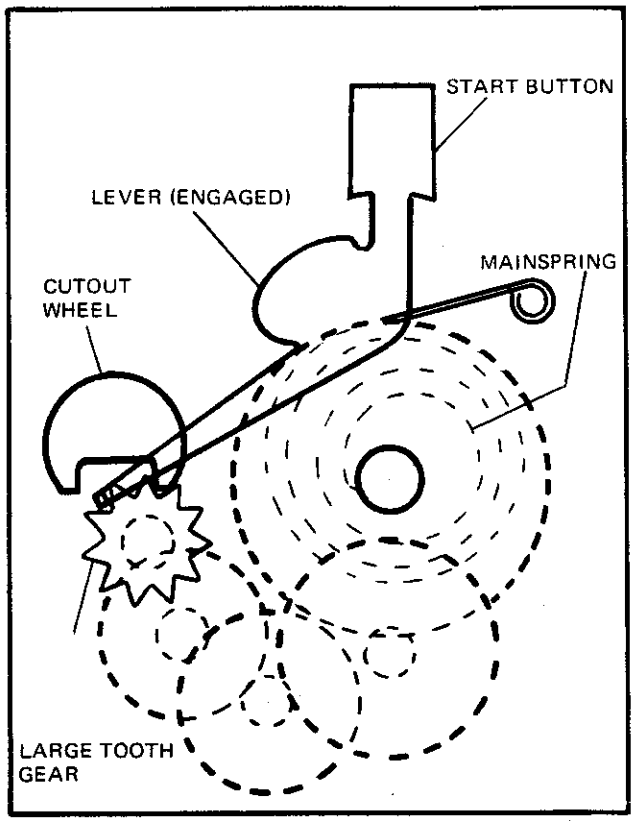


FIG. 2.11 INTERNAL CONFIGURATION OF THE MECHANICAL TIMER

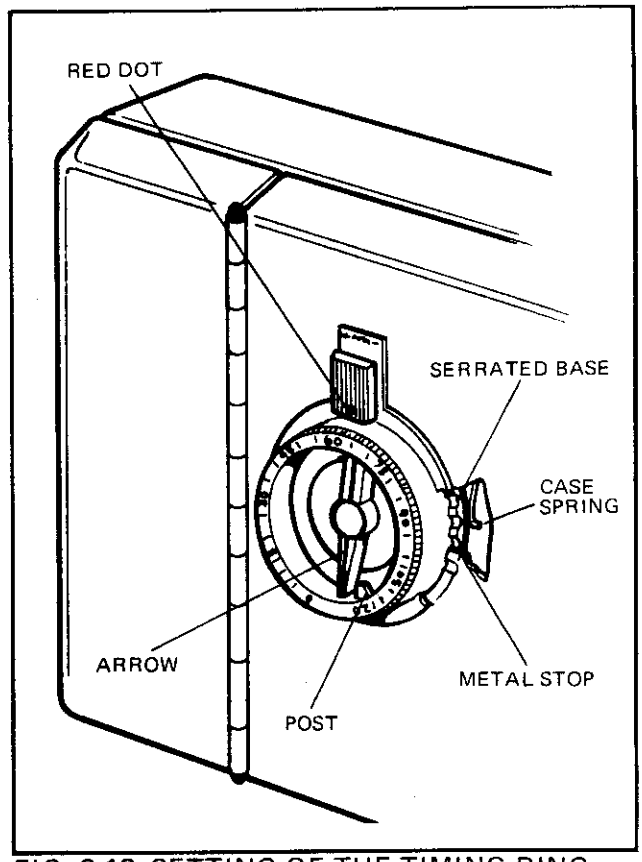


FIG. 2.12 SETTING OF THE TIMING RING

which indicates that the timer is in operation. This is accomplished by the revolution of the large-tooth gear as it brushes past the cutout on the wheel. It strikes the wheel producing a "whirring" sound. The second purpose of the gears is to provide a means by which the timer can be stopped. Note that the start button is connected to a lever. Moving the button to the right (as viewed from outside the camera) causes the lever to engage the large-toothed gear. This stops the gears which, in turn, stops the mainspring.

The post on the timing ring stops the arrow and thus determines how long the mainspring will be permitted to unwind. In Figure 2-12, you can see that the timing ring can be pushed in toward the lens since it is held in place by case springs mounted on the interior housing. By pushing the timing ring in, the serrated base is released from the metal stop on the door case. The timing ring can then be turned. Since the unwinding of the mainspring through the gears is at a set rate, the arrow speed is constant. Therefore, timing can be established by allowing the arrow to move through an arc which can be related to time. For example, if the dial is pushed in and set so that "60" is under the red dot, the arrow will move from the "60" until it hits the plastic stop at "0". At the rate of speed the mainspring unwinds, this arc is equivalent to 60 seconds.

Electronic Timer (Models 335, 350, and 360)

The electronic timer (Figure 2-13) measures elapsed time in frames of 15 seconds to 120 seconds. It does this by measuring the time it takes to charge a capacitor in the timing circuit. Because of the power requirements of the timer, a second 3 volt battery is needed in the camera

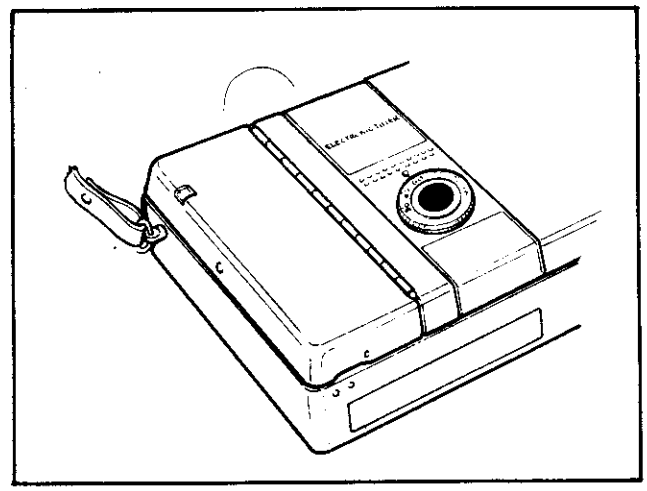


FIG. 2.13 ELECTRONIC TIMER

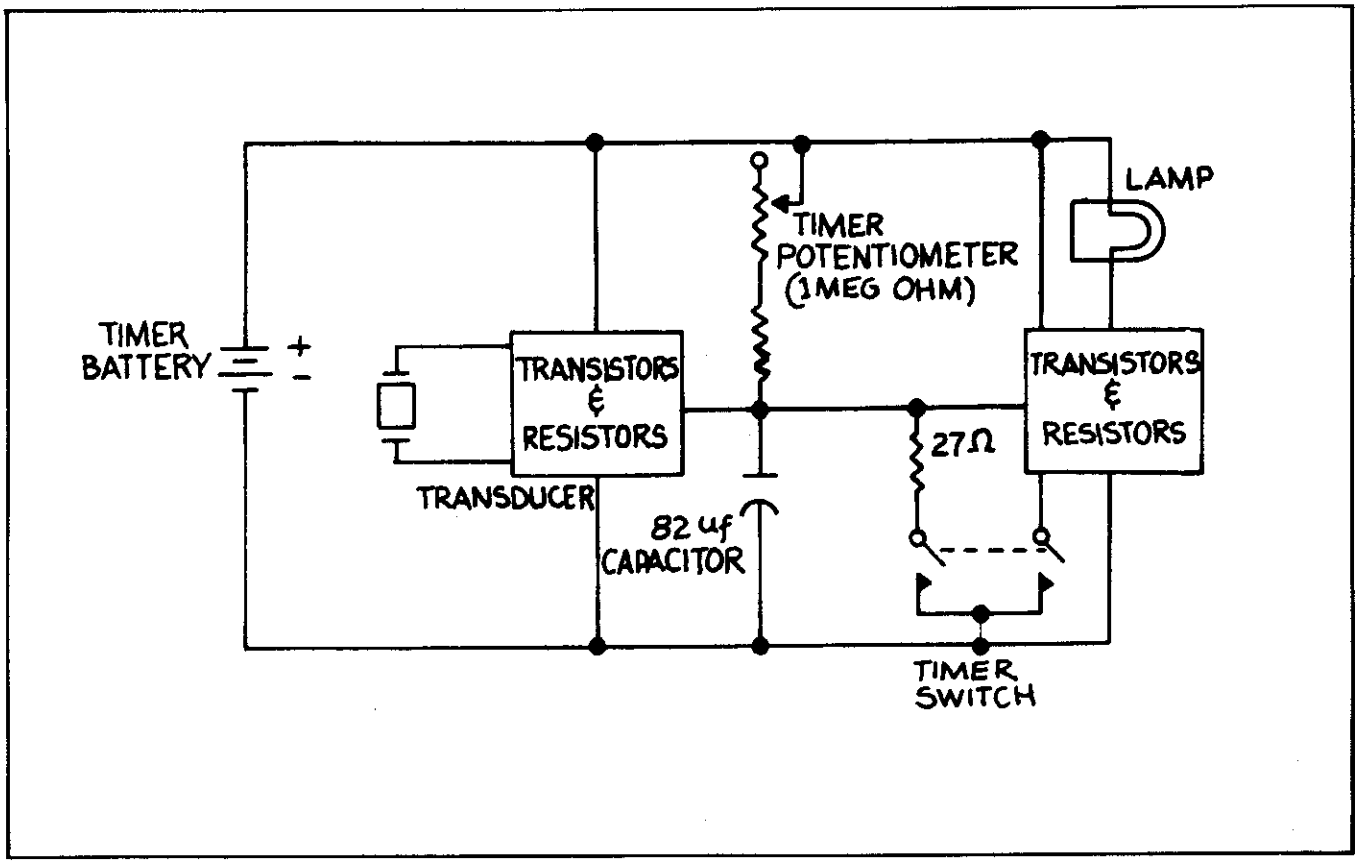


FIG. 2.14 ELECTRONIC TIMER SCHEMATIC

battery nest. Figure 2-14 presents the electronic timer schematic.

Operation of the timer starts with the setting of the dial on the camera back which is directly connected to the one megohm potentiometer shown in the schematic. (The potentiometer, in turn, is connected to the 82 microfarad capacitor.) Changing the dial setting alters the value (or resistance) of the potentiometer. For example, if the dial were set to 15, it would take 15 seconds for current passing through the potentiometer to charge the 82 microfarad capacitor.

The timing cycle is initiated by the removal of the exposed picture (pulling the yellow tab) from the camera. This momentarily closes a two-pole, normally open switch and completes the timing circuit. The closing of one pole allows the capacitor to fully discharge through the 27 ohm resistor, insuring that it has no residual voltage from a previous timing cycle. The closing of the second pole turns the IC* transistor/resistor circuit on and lights the lamp. When the switch opens, the 82 microfarad capacitor begins charging again. While the capacitor is charging, the lamp remains illuminated. Once the capacitor has fully charged, a difference in potential in the other IC transistor/resistor circuit excites the transducer which emits a high frequency "beep". At the same time, the lamp goes out. The high frequency "beep" coupled with the extinguishing of the lamp indicates that the timing cycle has been completed.

FLASHGUN

This discussion concerns itself only with the Model 268 flashgun used with all cameras in the 100, 200, and 300 lines, except for the Model 360. The electronic flash used with the Model 360 camera is covered in the "Repair Manual for the Polaroid Land Camera Model 360" published in September 1969.*

Early Model 268 flashguns were manufactured with a 4.5 vdc battery while newer flashguns rely on a 1.5 vdc cell for their power source. All 4.5 vdc flashguns should be converted to 1.5 vdc

* Integrated circuit

* Available only to authorized repair stations.

according to instructions in the Repair and Adjustment Procedures section of this manual. (The principles of operation cited for the 1.5 vdc flashgun below also apply to the early 4.5 vdc models.)

Figure 2-15 shows the Model 268 flashgun. The base assembly contains the battery and the battery contacts. The flash connector is inserted into the shutter baseplate to establish the connection to the flash contacts in the shutter. As shown in Figure 2-16, the sync connector plug is inserted into the baseplate and the shutter is cocked. In this condition, the Ss contacts are closed while the Sx contacts are open. Thus, the circuit is not completed. When the shutter is tripped, the Ss contacts remain momentarily closed and the Sx contacts also close, completing the shutter circuit. Current is then permitted to flow from the positive side of the 1.5 vdc flash battery, through the contacts, to the center terminal of the flashbulb socket. This causes the filaments of the M3 bulb to burn. Current is shut off by the release of the closing blade in the shutter which opens the Ss contacts. With this arrangement, the circuit is completed only when the film is being exposed and there can be no accidental flashgun firing.

The flash connector, in addition to the sync plug, has a bayonet-type plug which pushes aside a shield covering the photocell lens. This permits the photocell to function correctly when the flashgun is fired.

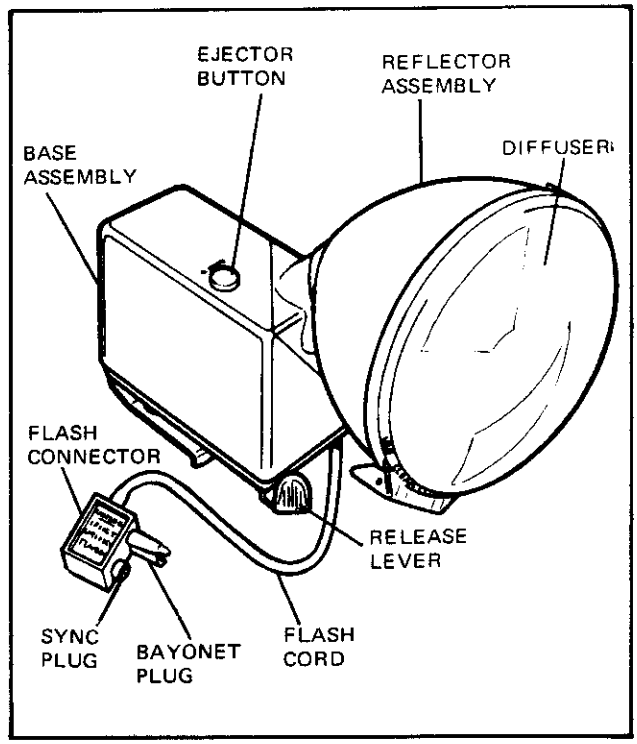


FIG. 2.15 FLASHGUN

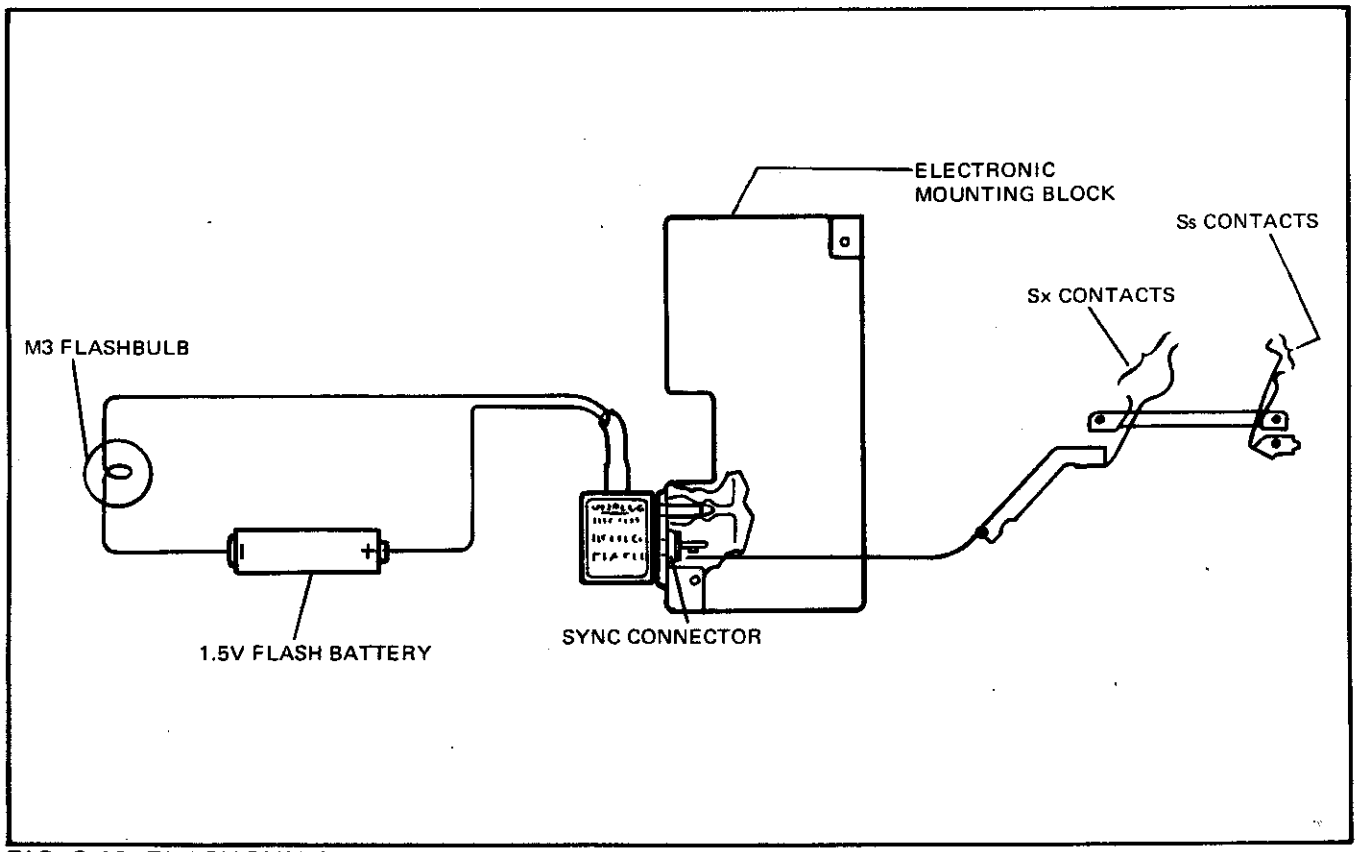


FIG. 2.16 FLASHGUN CIRCUIT

The flashgun's reflector assembly uses a blue diffuser to properly spread the brilliant flash of the M3 bulb. The entire relector can be swiveled through a complete circle. A detent spring locks it into place in one of three positions (see Figure 2-17):

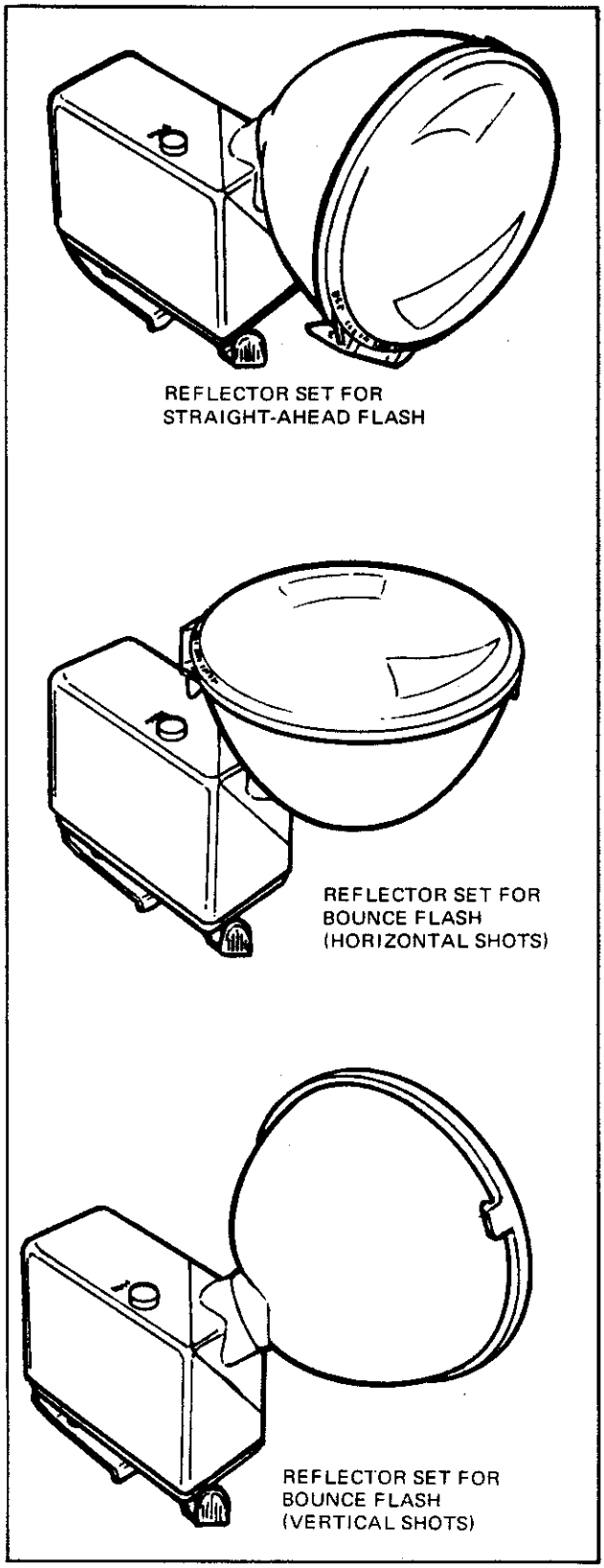


FIG. 2.17 REFLECTOR POSITIONS

1. For a straight-ahead flash using the full illumination of the bulb.

2. For a bounce flash in horizontal shots (to get soft light).

3. For a bounce flash in vertical shots.

When the bulb is installed in the reflector, it is forced down into a spring-loaded socket. A latch at the side of the socket clamps onto a lip on the bulb holding it firmly in place. After the bulb has been fired, the red ejector button is pressed. This causes the latch to move away from the bulb and the spring in the socket ejects the bulb.

The mounting hardware at the bottom of the base assembly is normally in the closed (or clamped) position. To place the flashgun on the camera, the release lever must be pushed. This opens the metal jaws so they can fit over the indentations in the camera body. When the lever is released, the jaws close and the gun is secured in place.

SECTION III - CAMERA CHECKOUT

Experienced repair personnel can normally diagnose customer complaints based on their own knowledge and with an occasional reference to the troubleshooting charts presented in Section IV. What is presented in this section of the repair manual is a detailed checkout which guides a newer repairman through a complete camera examination. The purpose of this thorough checkout is to acquaint new personnel with methods of isolating problems which might arise on all pack cameras and to acquaint experienced repairmen with testing methods for cameras of the 300 line. It is not to be construed as a mandatory procedure to be followed for every camera submitted for repair. (However, it should be used when repairing cameras to be returned to stock and for "redo" cameras.)

It should be emphasized that efficient and economical repair policies dictate that each camera submitted for repair should have the specific customer complaint investigated and the affected item repaired. (The repair order form should indicate that the complaint has been investigated, the affected item has been repaired and the camera checks out OK.) The camera should then be subjected to a quick visual inspection to uncover obvious faults which would contribute to other problems. If these faults affect camera performance they should also be repaired. If the faults seem to be of a nature which could eventually lead to camera deficiencies or if they detract from camera appearance it should be noted on the preshipment inspection area of the customer's copy of the repair order form. After the original problem has been corrected and the visual inspection has been completed, the camera should be cleaned and packed in a suitable container for return to the customer.

A. VISUAL INSPECTION

1. Examine the Neckstrap

Look for signs of excessive wear or faulty fastening rivets, tension slides, or keepers. Check that the D-rings on metal case cameras are properly closed, holding the strap securely. Also on metal case cameras, be sure that the strap lugs are properly secured in the camera body.

2. Examine the Front Cover Assembly

Release the top of the cover and gently swing it down into the open position. Ascertain that the hinge on the cover operates properly. Push up on the mounting plate spring and release the front cover from the camera. Check the tension of the clip spring assembly. It should be strong enough to hold an instruction booklet and/or cold clip.

3. Examine the Exterior of the Camera Body and the Rear Door

On plastic body cameras, pay particular attention to cracks which could cause light leaks. If there are dents in the body or door, be sure that they don't interfere with operation of the camera.

4. Examine the Rangefinder/Viewfinder (or the Image Sizer)

Look for cracks in plastic housings. Inspect the lenses to be sure they are not cracked or scratched. On folding rangefinder/viewfinders, check that the hinging action doesn't bind. The holding magnet should have some play around its pivot.

5. Examine the Rear Door Release Latch

Unlatch the rear door from the camera body. Check the action of the release latch to be sure it doesn't bind. Be sure the latch spring is in the proper position. Check the hinge area (especially on early Model 335) for excessive gap between the door and hinge. Close the rear door and be sure both sides latch properly.

6. Examine the Exit Door Assembly

Release the rollers from the roll latch (red) and pull them up out of the way. Look for broken plastic at the ends of the exit door. Push down at the number "4" on the exit door and then let go. The exit door should snap back into place. If it doesn't, check the pivot spring. **Be sure the entire exit door area is clean.**

7. Examine the Roller Assembly Area

With the rollers still in the unlatched position, examine them very closely for nicks, scratches, or encrusted foreign matter. Clean the rollers thoroughly* **(NEVER USE ANYTHING WHICH CAN SCRATCH THE ROLLERS.)** Be sure all four roller bushings are in place. Be sure the slide block assembly and the edge control bar move freely. If they don't, remove the slide block cover and check the springs. Also check the two spread roll springs to be sure they are in the proper position. Be certain none of the metal parts are bent out of shape. Inspect the door spring to be sure it is firmly secured to the rear door spider.

8. Examine the Spring Stop Area

Be sure the spring stop is secured to the body properly and that the light leak fillers are in place.

* Use only water to clean the rollers.

9. Examine the Bellows Mounts
The 14 metal tabs on the back of the bellows should be pressed tightly against the cutouts in the camera body. On some cameras, four Phillips head screws hold the front of the bellows to the shutter housing. On other cameras, four plastic studs are held by bellows fasteners. In either case, be certain that the front of the bellows is held tightly against the shutter housing. **Be sure the light seals are in place.**

10. Examine the Rear Lens
Be sure the lens is not cracked or scratched. **Clean the lens thoroughly.**

11. Examine the Focusing Linkage
Close the rear door of the camera and extend the bellows. Observe the action of the focusing linkage as the bellows is extended. It should allow the bellows to pop out when the right focus button is raised. When the shutter housing is pulled out all the way, you should be able to hear a "click" as the top inner frame locks into position. Close and then extend the bellows a few more times to be sure there are no binds in the movement. Examine all metal parts to be sure they are not bent. Push the focus buttons back and forth a few times to check on the smoothness of the focusing linkage movement. Also look into the rangefinder/viewfinder to determine that the focus bar is properly coupled to the optics assembly. Where applicable, check the condition of the fast focus decal on the right focus button. Also check the shutter shaft to be sure it is not bent or cracked.

12. Examine the Exterior of the Bellows
Look for a separation of the seam at the bottom of the bellows and for any deterioration of the bellows material.

13. Examine the Shutter Action
With the bellows still extended, cock the shutter. The number 3 button should move down smoothly into place. Press the shutter release button. The number 3 button should move back up smoothly and two "clicks" should be heard under **low light conditions.** If these criteria are not met, check battery voltage and wiring and then the shutter interlock. If these are OK, consult the "Repair Manual on Automatic Shutters" published in May, 1968 or if a Model 360, consult the "Repair Manual on Polaroid Land Model 360 Camera" published in September, 1969.*

14. Examine the Shutter Release Action
In conjunction with step 13, observe the action of the shutter release button. The button should trip the shutter when it is at about the same level as the top of the shutter release bezel. A special test for this is described later in this section.

15. Examine the Action of the Aperture Wheel or Film Speed Slide
Turn the aperture wheel through its four settings (two settings on some cameras) and observe (through the front lens) that the apertures are changing properly. Reset the scene selector and repeat. If any problems are evidenced, consult the "Repair Manual on Automatic Shutters." On other cameras, move the film speed slide back and forth and observe that the apertures, visible through the front lens, change. If problems are evident, consult the "Repair Manual on Automatic Shutters."*

16. Examine the "Darken-Lighten" Control
Move the lens bezel ("darken-lighten" control) through its full travel. Listen for any binding which might indicate a malfunction. If the control does not move freely, consult the "Repair Manual on Automatic Shutters."

17. Examine the Front Lens
Carefully inspect the front lens for cracks or scratches. **Be sure it is clean.**

18. Examine the Photocell Lens
Be sure this lens is free from cracks or scratches and is clean.

19. Examine the Top Etch Plate and the Front Etch Plate
The plates should be clean and free of blemishes. They should be firmly secured at their corners.

20. Examine the Tabs on the Bellows
Be sure the tabs holding the shutter release cable and the battery wires are secure.

21. Examine the Battery Compartment
Close the bellows and, if applicable, fold the rangefinder/viewfinder. **All cameras except Model 360:** Open the battery compartment door. The latch should hold the door firmly and there should be no play in the door. Be sure the door hinge isn't bent. Close the door again. It should snap shut.

Model 360: Use a pencil point to free the left-hand guard which covers the batteries. The handguard latch should hold the guard securely. Check that the handguard has a battery pad glued in place. Be sure the upper tab (which fits into the cutout in the battery compartment) isn't broken or cracked. Replace the handguard. It should snap into place.

* Available only to authorized repair stations.

All cameras: Remove the battery (Models 335, 350, and 360 have two batteries) from the battery holder. The battery should fit snugly in its cradle. Be sure that none of the plastic parts are broken. Carefully check the battery wires to be certain they are properly soldered to the terminals. The terminal socket should snap over the end of the battery. **Be certain there are no signs of corrosion on the terminals or in the battery cable. If corrosion is present, replace them.**

B. CHECKING SHUTTER BATTERY VOLTAGE

Using a Camera Repair Battery Tester, check the voltage of the shutter battery. The tester places a 27 ohm load across a 3 volt battery and an 80 ohm load across a 4.5 volt battery. The minimum readings are:

Battery under Test	Minimum Acceptable Reading
3 volt shutter battery	2.6 volts
4.5 volt shutter battery	4.1 volts

If the reading is less than that specified, replace the battery.

C. CHECKING THE SHUTTER INTERLOCK (METAL-BODY CAMERAS)

After checking shutter battery voltage, check the operation of the shutter interlock as follows (Models 100, 101, 102, 250, 240, 340, 350):

1. Extend the camera bellows to detent lock-in and cock the shutter.
2. Cover the photocell and trip the shutter. The second blade should stay open as long as the photocell is covered.

If the blades close together after having determined that the shutter battery is OK, check the interlock. First, clean the interlock contacts as thoroughly as possible. Be sure the wiring is properly soldered to the contacts. There should be tension evident when the top contact is lifted (with a pencil point). After making these checks, re-perform steps 1 and 2 above. If the blades still close together check the continuity between the interlock contact and the contact on the handguard. If this is OK and the problem remains, consult the "Repair Manual on Models 362, 366, and 374 Automatic Shutters." (If a Model 360, consult the "Repair Manual on the Model 360 Camera.")*

* Available only to authorized repair stations.

D. CHECKING THE SHUTTER RELEASE BUTTON

The #2 shutter release button should be set to allow easy tripping action and yet should be protected against accidental tripping. To determine that the button is at the right height, perform the following test:

1. Extend the bellows to detent lock-in and cock the shutter.
2. Place the recessed end of gauge #A169452 over the release button and push down until the gauge is butted against the bezel (Figure 3-1). The shutter **SHOULD NOT** trip.

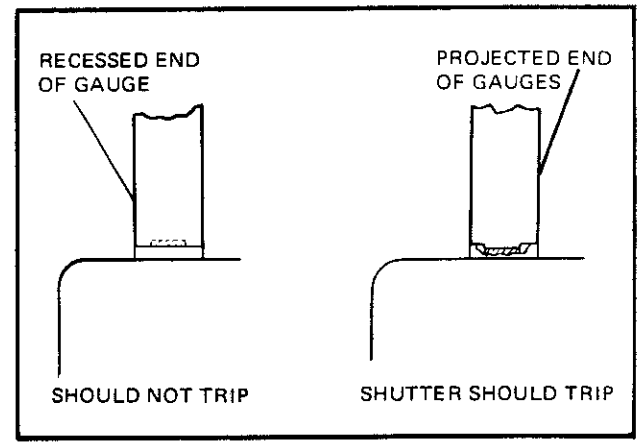


FIG. 3.1 SHUTTER RELEASE BUTTON CHECK

3. Reverse the gauge and position the end of the gauge with the projection on the release button. Push down until the gauge is butted against the bezel. The shutter **SHOULD** trip.

If these standards are not met, refer to Section V for the method of adjusting the shutter release button.

E. MEASURING TIMER ACCURACY

Electronic Timer:

Set the timer dial to 60 and actuate the timer switch. Using a stop-watch, measure the time interval between actuation and the "beep". It must be between 58 and 64.5 seconds. Also observe that the lamp lights. If the timing is off, or the lamp does not light (or no sound), replace the timer.

Mechanical Timer:

Set the arrow to 60 and start the timer. Using a stopwatch, measure the time interval between start and stop. It must be between 54 and 66 seconds. If the timer does not perform within this specification, replace it.

F. MEASURING TIMER BATTERY VOLTAGE AND CURRENT DRAIN (Models 335 and 350)

1. Open the back door of the camera and release the rollers from their latch to make the timer switch accessible.
2. Open the battery compartment of the camera. Trip the timer switch and place the probes of a multimeter set at 3 vdc across the terminals of the timer battery while it is still connected. If the reading is not at least 2.6 volts, replace the battery.
3. Disconnect the positive end of the timer battery from the terminal. Place one probe of a microampere meter on the positive terminal of the battery and the other probe on the terminal receptacle as shown in Figure 3-2.

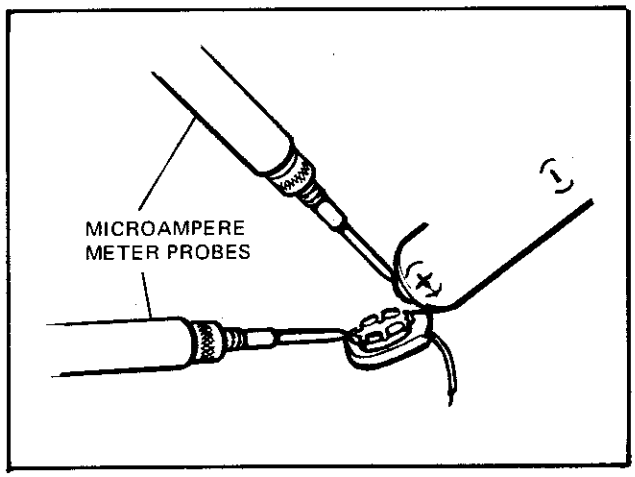


FIG. 3.2 TIMER BATTERY CURRENT DRAIN TEST

4. If the reading on the meter is less than 20 microamps, reassemble the camera. If the reading is greater than 20 microamps, check the timer switch. Be sure it is not bridged closed. If the switch is OK, replace the electronic timer.

G. TIMER SWITCH CONTINUITY CHECK

If any timer switch problems are suspected, perform the timer switch check and adjustment described in Section V.

H. CHECKING THE LENS AND RANGEFINDER/VIEWFINDER (COLLIMATION)

The lens and rangefinder/viewfinder on each camera must be tested as a pair to match their optical characteristics. If any repair is performed which could affect the characteristics of either, the camera should be subjected to the following checks:

1. Remove the front cover and extend the bellows to detent lock-in.
2. Set the aperture wheel to "75". Cameras with a film selector should be set to the "75" or "Color" position.
3. If the camera has a scene selector, set it to the "Bright Sun or Dull Day - Also Flash" position.
4. Move the focus bar to the INFINITY position.
5. Open the rear door and mount the camera on the Polaroid collimator. Clamp the focal plane plate into position on the camera as shown in Figure 3-3.

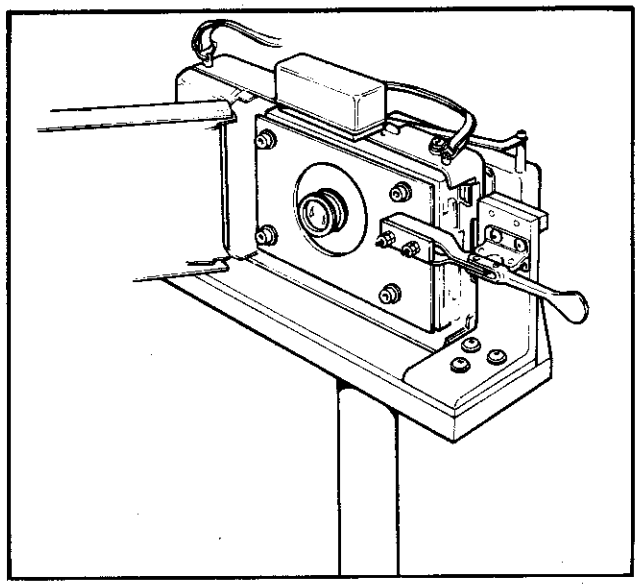


FIG. 3.3 CAMERA MOUNTED ON COLLIMATOR

6. Lens Infinity Check: Aim the camera at the infinity tube target. Hold a finger over the photocell and cock and trip the shutter (hold the trip button down). Observe the target through the lens loupe.

Specifications are:

Duplet Lenses -- The minimum number of lines which are clear and legible must be 7 lines/mm.

Triplet Lenses – The minimum number of lines which are clear and legible must be 40 lines/mm.

If the specifications are not met:

Duplet Lenses – Duplet lenses cannot be collimated. If the 7 lines/mm grouping is not clear, check the lenses for smears. Be sure they are properly seated in their mounts. If the lenses are clear and firmly mounted and the customer has complained of out of focus pictures, take a picture. If the picture is out of focus, replace the lenses according to procedures in Section V.

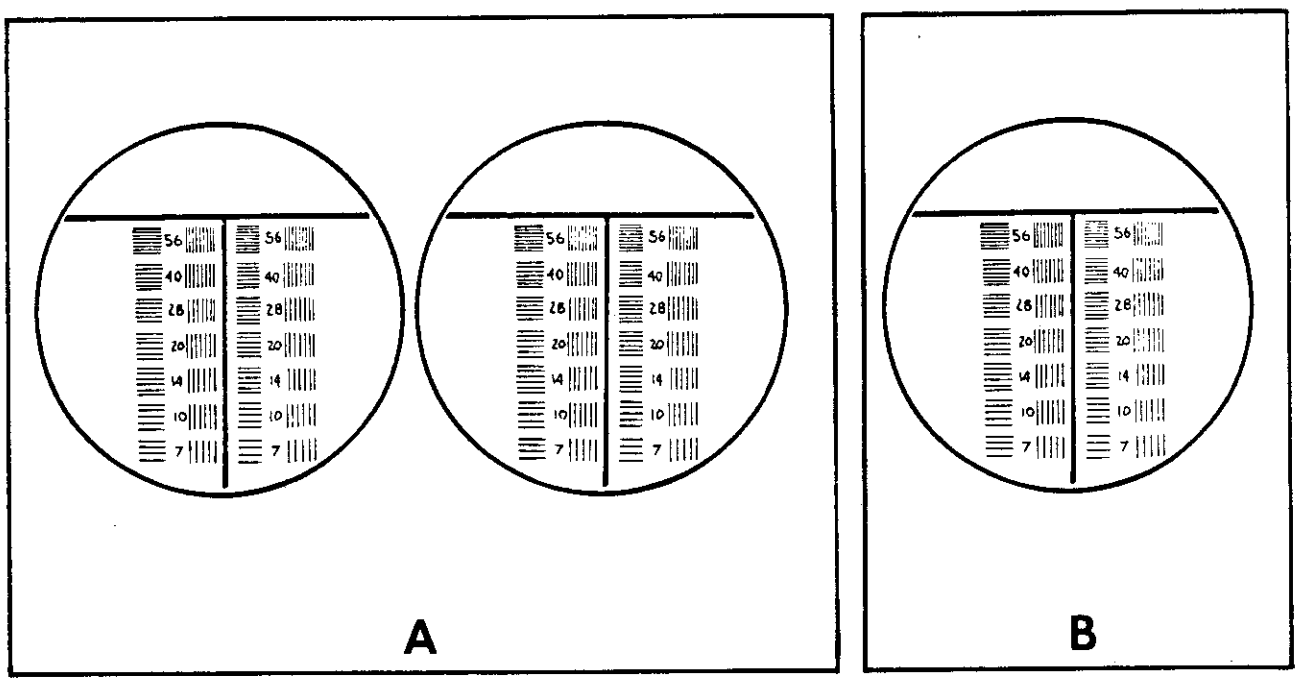


FIG. 3.4 INFINITY TUBE TARGET

Triplet Lenses – If the 40 lines/mm grouping is not clear, collimate the lens according to procedures in Section V.

7. RF/VF Infinity Check (Range & Topside): (This procedure does not apply to image sizers. After checking lenses on cameras with image sizers, aim the fixture toward a plain background and look through the image sizer window. Move the focus bar from the CLOSE-UP to the INFINITY position. The movable horizontal line in the image sizer should move up to butt against or merge with the fixed horizontal line. Also, no portion of the fixed line may be visible below the movable line. If necessary, adjust image sizer range as instructed in Section V.) After the lens has been checked at infinity, look at the tube target through the RF/VF focusing window. Move the focus bar to CLOSE-UP. Note that the target moves becoming two separated images (Figure 3-4A). Move the focus bar back to INFINITY. The horizontal and vertical lines of the target should butt or be superimposed. If they do not, perform the RF/VF Range/Topside adjustments in Section V.
8. Four Foot Check: After the lens and RF/VF have been checked at infinity, swing the camera around to the four foot target. While looking through the focal plane plate loupe, move the focus bar toward CLOSE-UP.

   Stop when the image is sharpest. This indicates that the camera is set at four feet. Now, look through the RF/VF eye window. The vertical and horizontal lines of the larger crosshair target (Figure 3-5) should be merged. If they are not, perform the range/topside adjustments in Section V. Then, repeat the infinity check.

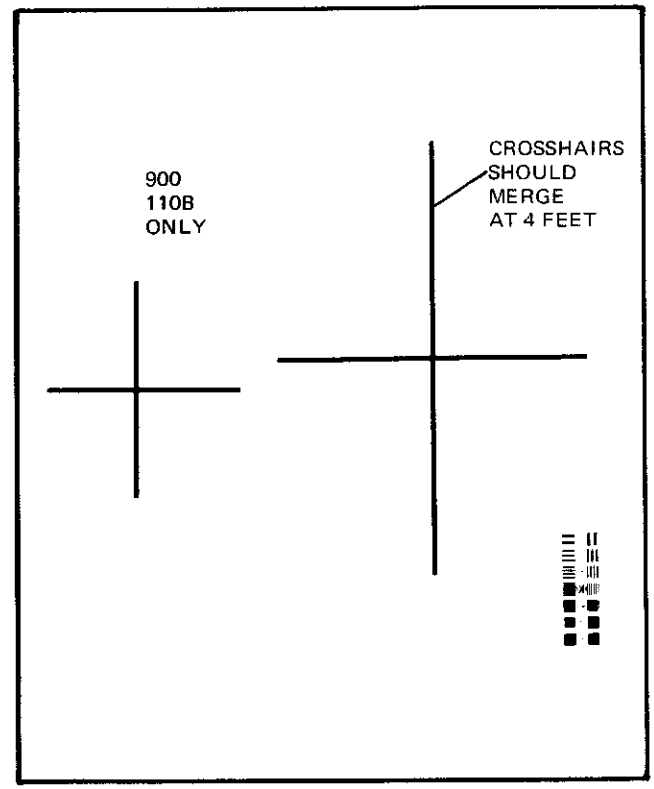


FIG. 3.5 FOUR FOOT TARGET

I. RANGEFINDER/VIEWFINDER PARALLAX CHECK

RF/VF parallax should be tested only after the lens and RF/VF have been collimated.

1. Remove the front cover and extend the bellows to detent lock-in.
2. Open the rear door and mount the camera on the Polaroid collimator. Clamp the focal plane plate into position on the camera.
3. Aim at the frame target, look through the RF/VF eye window and make the following checks:

Zeiss Ikon RF/VF

a. Move the focus bar to CLOSE-UP: Observe that the top horizontal line of the yellow projected frame image is within the area bounded by the 180 close-up target lines (Figure 3-6). If it isn't, adjust the horizontal parallax as instructed in Section V.

NOTE: "180" on the target refers to Zeiss Ikon RF/VF's. "100" refers to Polaroid RF/VF's and image sizers.

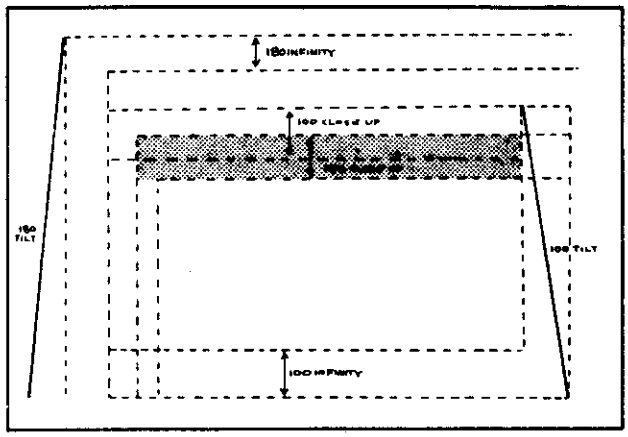


FIG. 3.6 FRAME TARGET - 180 CLOSE-UP

b. Move the focus bar to INFINITY: Observe that the top horizontal line of the yellow projected frame image is within the area bounded by the 180 infinity target lines (Figure 3-7). If it isn't, adjust the horizontal parallax as instructed in Section V.

Observe that the left side vertical line of the yellow projected frame image is within the area bounded by the 180 tilt target lines (Figure 3-7). If it isn't, adjust the vertical parallax as instructed in Section V.

Polaroid RF/VF

a. Move the focus bar to CLOSE-UP: Observe that the right side and top lines of the projected frame image are within the area bounded by the 100 close-up and 100 tilt target lines (Figure 3-8). If they are not, adjust the parallax as instructed in Section V.

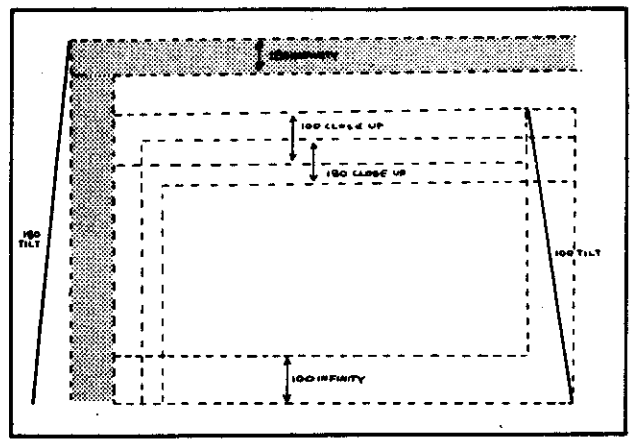


FIG. 3.7 FRAME TARGET - 180 INFINITY & 180 TILT

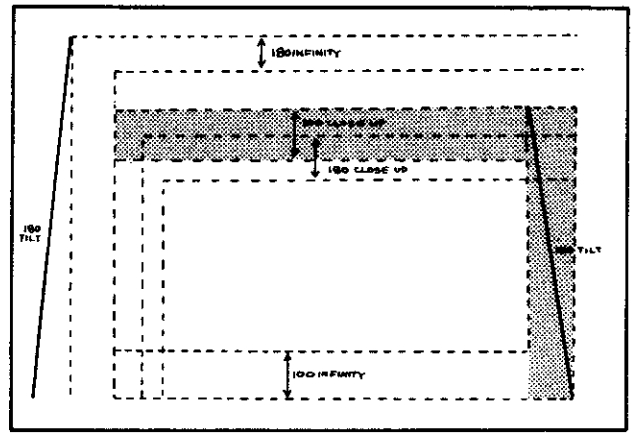


FIG. 3.8 FRAME TARGET - 100 CLOSE-UP & 100 TILT

b. Move the focus bar to INFINITY: Observe that the right side and bottom lines of the projected frame image are within the area bounded by the 100 infinity and 100 tilt target lines (Figure 3-9). If they are not, adjust the parallax as instructed in Section V.

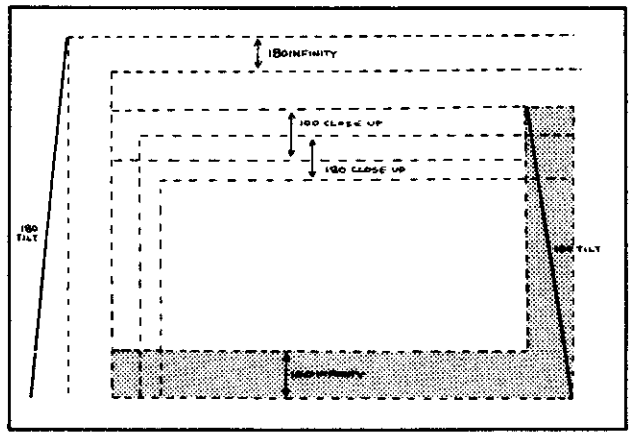


FIG. 3.9 FRAME TARGET - 100 INFINITY & 100 TILT

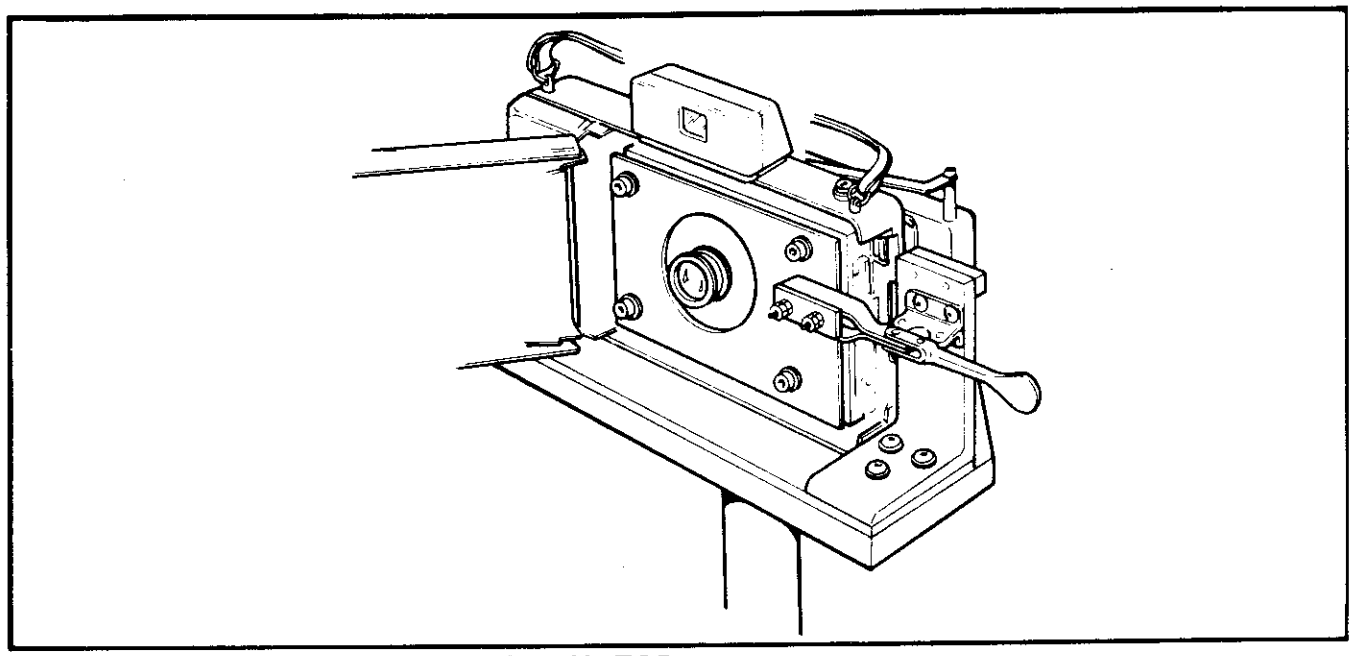


FIG. 3.10 CAMERA MOUNTED ON COLLIMATOR

J. IMAGE SIZER PARALLAX CHECK

Image sizer parallax should be checked only after the lens and sizer have been collimated.

1. Remove the front cover and extend the bellows to detent lock-in.
2. Open the rear door and mount the camera on the Polaroid collimator. Clamp the focal plane plate into position on the camera as shown in Figure 3-10.
3. Aim the camera at the frame target and move the focus bar to CLOSE-UP. Observe the target through the image sizer window and check that the inside points of the top and right side diamonds of the projected frame image are within the area bounded by the 100 close-up and 100 tilt target lines (Figure 3-11). If they are not, repair or replace the image sizer according to the instructions in Section V.

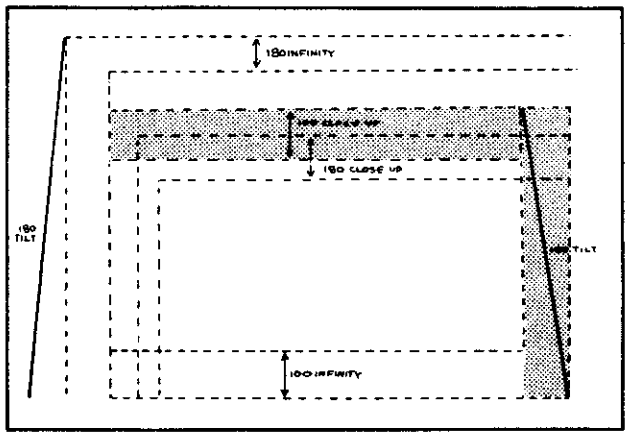


FIG. 3.11 FRAME TARGET - 100 CLOSE-UP & 100 TILT

K. BELLOWS LIGHT LEAK TEST

Remove the front cover and extend the bellows to detent lock-in. Open the rear door and bring the camera into a darkroom. Place a bright bulb inside the bellows area of the camera. (Do not allow the bulb to remain on one spot longer than necessary.) Press the bulb against the bellows, pushing the folds outward. Run the bulb down the four corners and then around the entire inner surface of the bellows, still pushing the folds out. Slowly pass the bulb around the light seal next to the body assembly and then around the light seal next to the shutter housing. If any pinholes or worn spots which pass light are observed, replace the bellows.

L. FLASHGUN TESTING

Examine the border around the instructions on the base of the flashgun (Figure 3-12). If the border completely encloses the instructions, it

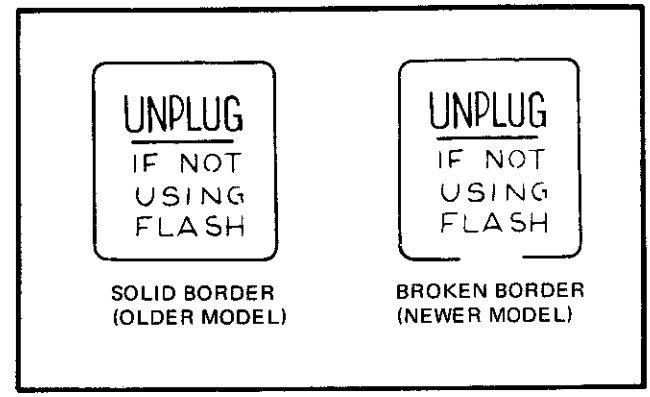


FIG. 3.12 FLASHGUN IDENTIFICATION

indicates that the flashgun might be an early model with a 4.5 vdc battery and stainless steel or phosphor bronze clips. These flashguns must be opened for inspection. If they are early model flashguns, convert them according to procedures in Section V and then test them as indicated below. If the border around the instructions is broken, continue with the flashgun test below.

1. Place a special no-load dummy plug in the flashgun and plug the flashgun into the Universal Flashgun Tester (see Figure 3-13). The tester should be set to the 2.5 vdc scale.

2. With the toggle switch in the proper position (the switch reverses polarity), the indicator in the meter should move up to the range shown in Figure 3-14 (1.2 vdc to 1.5 vdc).

   If the reading is less than this, replace the battery. If there is no reading at all, there is an open in the circuit. Open the flashgun and look for corroded contacts or battery wires.

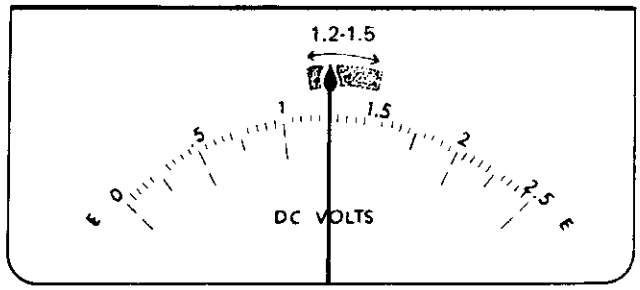


FIG. 3.14 FLASHGUN BATTERY SPECIFICATION

3. Push the load button. This places a 1 ohm load across the battery. The indicator should drop to a minimum of 0.9 vdc. If the indicator drops lower than 0.9 vdc, replace the battery.

4. Remove the dummy plug from the flashgun and insert an EEK test flashbulb in its place.

5. Push the flash button. This places the 1 ohm load plus the resistance of the test flashbulb across the battery. The bulb should light. If it doesn't it indicates that the battery cannot sustain the combined load and should be replaced.

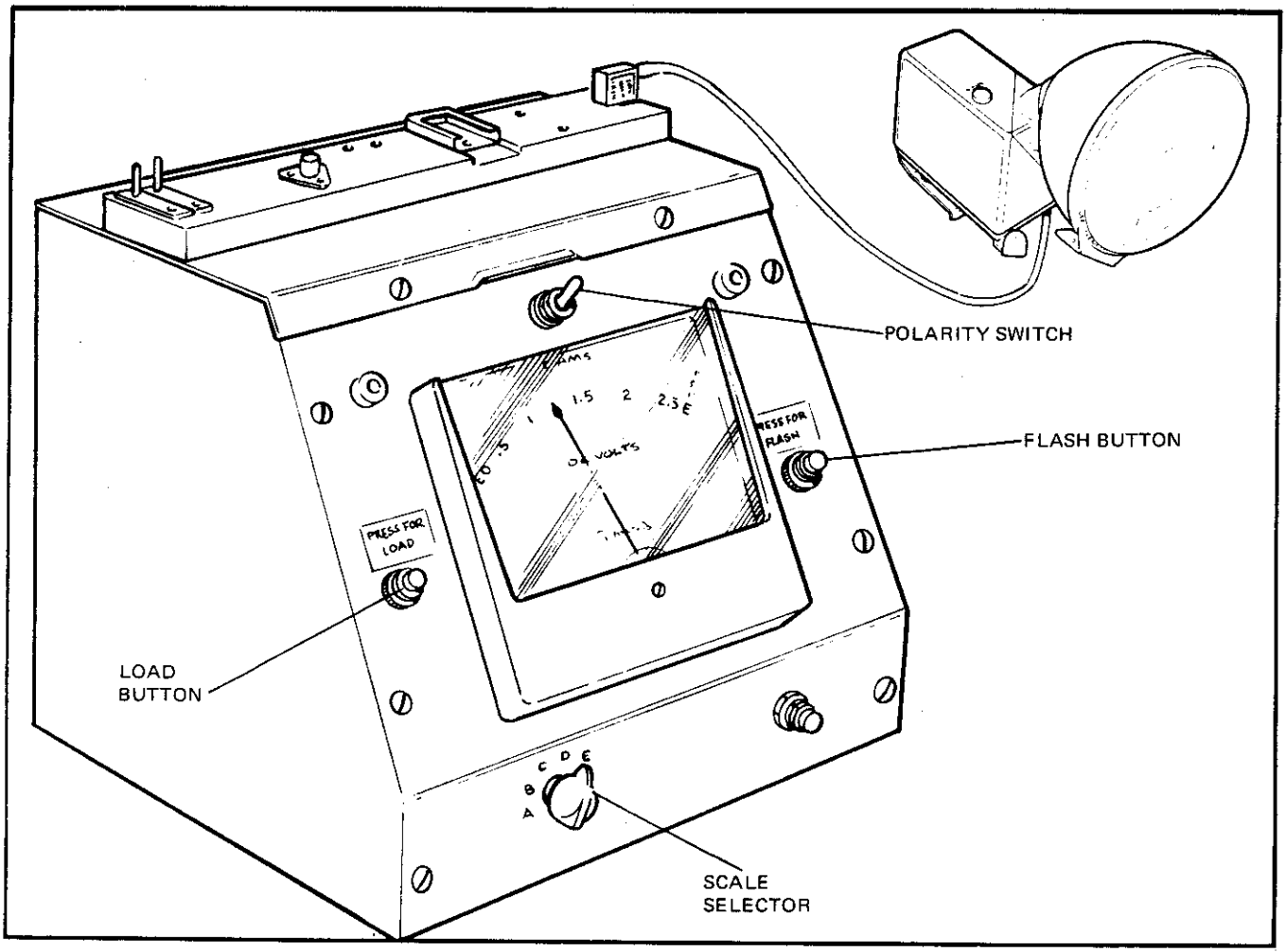


FIG. 3.13 UNIVERSAL FLASHGUN TESTER

SECTION IV - TROUBLESHOOTING CHARTS

Persons unfamiliar with Polaroid pack cameras should study the contents of Section II and III to gain an adequate background of camera operation and checkout. Once this knowledge is absorbed, reference to these troubleshooting charts should be sufficient to diagnose camera problems in most cases. The methods of implementing the corrective actions are detailed in Section V.

Pages are provided for repairmen to make notes pertaining to troubleshooting each area of the camera and flashgun.

PROBLEMS EVIDENCED IN PICTURES

PROBLEMS	PROBABLE CAUSE	CORRECTIVE ACTION
Picture completely black (other than shutter electronics).	1. Shutter battery dead.	1. Replace shutter battery.
	2. Battery interlock defective.	2. Test interlock and adjust or replace if necessary.
	3. Battery terminals corroded.	3. Replace battery terminals.
	4. Object in focal plane.	4. Examine bellows area and shutter.
Picture fogged (light leak).	1. Bellows worn.	1. Replace bellows.
	2. Bellows light seals missing.	2. Install bellows light seals.
	3. Sponge fillers missing from camera body.	3. Replace fillers.
	4. Rear door hinge loose.	4. Repair or replace rear door.
	5. Camera body cracked.	5. Repair camera body.
	6. Bellows fastener loose or missing.	6. Replace bellows fastener.
Pictures constantly out of focus.	1. RF/VF defective.	1. Perform Range/Topside adjustments. (Replace RF/VF if necessary).
	2. Lens out of collimation.	2. Collimate lens (replace duplet lens).
	3. Lenses loose.	3. Install lenses properly.
	4. Lenses smeared.	4. Clean lenses thoroughly.
	5. Lenses cracked.	5. Replace lenses.
	6. Focusing linkage bent.	6. Replace inner frames or U-frame.
	7. Film pack loose in camera.	7. Repair either spring stop, door spring, or roll frame springs.
	8. A.O. lens matched with Polaroid lens (duplet).	8. Match A.O. front to A.O. rear or Polaroid front to Polaroid rear.
	9. Lens installed upside down.	9. Use gage to measure lens and re-install if necessary.
Pictures not properly framed.	1. RF/VF parallax not adjusted.	1. Perform RF/VF parallax adjustments.
	2. RF/VF magnet binding.	2. Replace magnet pivot.
	3. RF/VF defective.	3. Replace RF/VF.

NOTES

PROBLEMS EVIDENCED IN PICTURES (continued)

PROBLEMS	PROBABLE CAUSE	CORRECTIVE ACTION
Pictures under-exposed - too dark. (Other than shutter electronics.)	1. Photocell getting too much light: a. Cell wedge broken or jammed in fully "darken" position. b. Flash filter spring broken or out of position. c. Flash filter arm broken.	1. Correct by: a. Repair or replace cell wedge. b. Repair or replace spring. c. Replace flash filter assembly.
Pictures over-exposed - too light. (Other than shutter electronics.)	1. Photocell not getting enough light. a. Cell wedge very dirty or jammed in "Lighten" position. b. In flash shots: flash filter is not lifted out of way. 2. Broken part causing second blade to bind.	1. Correct by: a. Clean cell wedge or repair cell wedge assembly. (Replace if necessary) b. Repair or replace flash filter assembly. 2. Disassemble baseplate from shutter housing and remove any foreign matter.
Pictures under-developed. (Color film will be orange-brown).	Faulty timer (Models 335 and 350) or customer not compensating for temperature variances.	Replace timer assembly and instruct customer.

NOTES

ELECTRONIC TIMER

PROBLEM	PROBABLE CAUSE	CORRECTIVE ACTION
Battery voltage low. (Less than 2.6 vdc.)	Battery weak.	Replace timer battery.
Battery drain greater than 20 microamps.	Timer faulty.	Replace timer assembly.
Timer completely dead. (No light, no sound)	1. Timer battery dead. 2. Defective timer switch. 3. Break in the timer cable. 4. Defective timer.	1. Replace battery. 2. Adjust or replace the timer switch as detailed in Section V. 3. Repair or replace. 4. Replace the timer assembly.
Timer is inaccurate.	Electronic component defective.	Replace timer assembly.
Lamp doesn't light.	1. Battery dead. 2. Bulb burned out. 3. Switch contacts not making. 4. Open in the timer circuit. 5. Defective timer.	1. Replace battery. 2. Replace timer assembly. 3. Adjust switch as detailed in Section V. 4. Replace the timer assembly. 5. Replace the timer assembly.
Lamp will not extinguish.	1. Switch contacts bridged. 2. Short circuit in the timer.	1. Repair or replace switch. 2. Replace the timer assembly.
No "beep" at end of timing cycle (after lamp has lit).	Brass transducer plate out of position.	Replace the timer assembly.
Timer "beeps" intermittently long after timing cycle completed.	Lamp burned out.	Replace the timer assembly.

NOTES

MECHANICAL TIMER

PROBLEM	PROBABLE CAUSE	CORRECTIVE ACTION
Timer inaccurate	Mechanical component faulty.	Replace timer assembly.
No sound.	Loose gear.	Replace timer assembly.
Printing on timing ring worn off.	Excessive handling.	Replace timing ring.
Start button will not hold timer "off".	Lever bent or broken.	Replace timer assembly.

NOTES

SPREAD SYSTEM

PROBLEM	PROBABLE CAUSE	CORRECTIVE ACTION
Bad spreads	1. Rollers dirty.	1. Clean rollers.
	2. Rollers nicked or scratched.	2. Replace rollers.
	3. Exit door area dirty.	3. Clean exit door area.
	4. Tab strip bar broken or missing.	4. Replace tab strip bar.
	5. Roller bushings dirty.	5. Clean bushing area.
	6. Roller bushings missing.	6. Replace bushings.
	7. Roller supports bent.	7. Replace spider.
	8. Spread roll springs bent or missing.	8. Replace spread roll springs.
	9. Edge control bar springs.	9. Replace edge control bar.
	10. Edge control bar bent.	10. Replace edge control bar.

NOTES

RANGEFINDERS/VIEWFINDERS

PROBLEM	PROBABLE CAUSE	CORRECTIVE ACTION
Viewfinder image, superimposed image or Albada lines missing.	Optical component missing.	Zeiss Ikon - Replace entire unit. Polaroid RF/VF - Replace cantilever assembly. Image Sizer - Repair or replace image sizer.
Line across either viewfinder or rangefinder image.	Broken optical component.	Zeiss Ikon - Replace entire unit. Polaroid RF/VF - Replace cantilever assembly. Image Sizer - Repair or replace image sizer.
Broken window glass.	Mishandling.	Replace glass on folding Polaroid RF/VF. On fixed Polaroid RF/VF, replace housing or rear window plate. On Zeiss Ikon, replace entire RF/VF assembly. On Image Sizers, replace entire assembly.
RF/VF movable parts sticky or not moving.	Defective mechanisms.	Zeiss Ikon - Replace entire unit. Polaroid RF/VF - Replace cantilever assembly. Image Sizers - Replace entire unit or repair.
Range/Topside or Parallax not set properly.	Unit out of adjustment.	Adjust RF/VF or Image Sizer according to instructions in Section V.

NOTES

MISCELLANEOUS

PROBLEM	PROBABLE CAUSE	CORRECTIVE ACTION
Shutter not tripping.	1. Foreign matter jamming shutter mechanisms. 2. Shutter release button not set properly. 3. Shutter release cable crimped.	1. Disassemble baseplate from shutter housing and remove any foreign matter. 2. Adjust shutter release button. 3. Replace shutter release button and cable.
Shutter trips too easily.	Shutter release button not set properly.	Adjust shutter release button.
Film tearing.	1. Exit door malformed (not opening properly). 2. Edge control bar assembly not free. 3. Edge control bar bent. 4. Slideblock defective. 5. Tab strip bar broken.	1. Replace exit door. 2. Clean area thoroughly. Replace broken or missing parts. 3. Replace edge control bar. 4. Replace slide block. 5. Replace tab strip bar.
Camera hard to focus.	1. Brake rivet bent. 2. Focus bar bent. 3. Focus linkage binding. 4. Focus linkage bent.	1. Replace rivet. 2. Replace focus bar. 3. Clean and lubricate if possible. 4. Replace linkage.

NOTES

MODEL 268 FLASHGUN

PROBLEM	PROBABLE CAUSE	CORRECTIVE ACTION
Inoperative Flashgun	1. Dead flashgun battery.	1. Replace flash battery.
	2. Defective shutter connection.	2. Refer to shutter manual.
	3. Defective flashgun connector.	3. Replace flashgun connector.
	4. Defective flashgun socket.	4. Replace socket.
	5. Dirty or corroded battery contacts.	5. Clean or replace contacts.
	6. Broken or cold-soldered connection.	6. Check and re-solder connections.

POLAROID 101 Flash problem

Flash attachment may be inoperative even though it can be fired by shorting out the tip contacts . The cause may be dead and /or corroded camera operating battery . Flash will not work unless there is power on the shutter. Also, the small angular metal piece next to the PC tip on the flash unit plays a major role in flash operation. This part moves a small spring-loaded leveR inwards into the shutter which moves the perforated mask from behind the electric-eye lens allowing more light to reach the cell.

SECTION V - REPAIRS & ADJUSTMENTS

If a part name in this section sounds unfamiliar, refer to Section VI, Parts Identification, for its identity and location. Also, the exploded view drawings should be used to supplement the drawings in the Repairs & Adjustments section.

Special tools called out in this section are identified by either Camera Repair part numbers or blue print part numbers. To eliminate confusion which may arise from this, the following table is provided. The table cross-references Camera Repair numbers to blue print numbers. When ordering special tools, use the blue print number and part name. Order from:

POLAROID CORPORATION
Technical Services Department
89 Second Avenue
Waltham, Massachusetts 02154

BLUE PRINT NUMBER	CAMERA REPAIR NUMBER	NAME
B-CR-11006	CR1006	Tinnerman Remover
B-CR-11007	A169446	Lens Focuser & Remover
A-CR-11014	CR1007	Tinnerman Remover
A-CR-11015	A169451	RF/VF Pin Remover & Inserter
B-CR-11016	A169454	Focus Bar Rivet Remover
B-CR-11026	A169450	Link Pivot Remover
A-CR-11028	A169441	Shutter Crimping Tool
A-CR-11039	CR1004	RF Parallax Nut Wrench
A-CR-11040	A169448	Shutter Screwdriver
B-CR-11047	CR1025	Jig for Bellows Posts
B-CR-11049	CR11008	Tinnerman Inserter (Bellows)
B-CR-11050	CR1002	Tinnerman Inserter (Hand Guard)
A-CR-11051	B169452	GO-NO-GO Gage
C-CR-11055	A169456	Rear Lens Remover
C-CR-11056	CR1000 & CR1000A	Lens Remover Nest
B-CR-11077	A169447	Bellows Pliers
A-CR-11092	A11092	VF Wrench (Hex)
A-CR-11093	A11093	VF Screwdriver (Phillips)
B-CR-11211	A169442	Focus Bar Rivet Inserter
B-CR-11213	A169455	Pivot Stud Remover & Inserter
B-CR-11216	CR1010	Focus Button Riveter
A-CR-11219	A169443	RF/VF Screwdriver
B-CR-11220	A169489	Link Pivot Inserter
A-CR-11237	CRG001	Lens Gage
B-CR-11357-1 thru -4	-------	De-Sta-Co Deriveter & Riveter (Rear (door
3-CR-11394	B11394	Lens Nest
B-CR-11397	B11397	VF Pivot Deriveter
B-CR-11398	B11398	VF Pivot Riveter
B-CR-11402	B11402	VF Rivet Staking Tool
A-CR-1140	A11410	Release Bushing Remover

CONVERSION OF PACK CAMERAS WITH SERIAL NUMBERS STARTING WITH "AA"

All pack cameras having serial numbers which start with an "AA" prefix must have the tab strip bar, slide block cover, and edge control bar replaced. Convert these cameras as follows:

Removal

1. Open the rear door of the camera.
2. Remove the tab strip bar from the camera body by removing its two retaining screws. Save the tab strip bar for return to the customer. (If the camera was brought through customs, the serial number was probably recorded. Therefore, it may be necessary to have the old tab strip bar with the original serial number to prove camera ownership prior to its arrival in the country. Inform the customer of the need to keep the tab strip bar.)

3. Remove the three screws holding the slide block cover and remove and discard the cover. Also discard any washers or shims which may be under the cover.
4. Remove the edge control bar as instructed in the "Slide Block Replacement" procedure. Discard the control bar.

Replacement

1. Install a new edge control bar as instructed in the "Slide Block Replacement" procedure.
2. Install a new slide block cover and secure it with three screws which held the old one in place. Be sure the edge control bar shaft is not jammed under the cover.
3. Install a new tab strip bar on the camera body body and secure it with the two retaining screws.
4. Transfer the original serial number to the new tab strip bar as instructed in the next procedure.

SERIAL NUMBER TRANSFER

If it is necessary to replace the tab strip bar on metal-body cameras or the entire body assembly on plastic-body cameras, **ALWAYS TRANSFER THE ORIGINAL SERIAL NUMBER TO THE NEW PART.** Use white Deca-Dry transfer symbols to transfer the number.

REAR DOOR (BACK COVER) REPLACEMENT

Removal

1. Remove the timer assembly (if present). Refer to procedure "Electronic Timer Replacement" or "Mechanical Timer Replacement."
2. Remove the rear door from the spider by removing the four rear door rivets using a De-StaCo tool with anvil B11357-part 1 and head B11357-part 2. Remove the rear door and roll latch.

Replacement

1. Position the roll latch (and electronic timer if applicable) in the spider and secure the new rear door to the spider by replacing the four rivets. Use a De-StaCo tool with anvil B11357-part 3 and head B11357-part 4.
2. Assemble the timer assembly (if applicable) to the rear door.

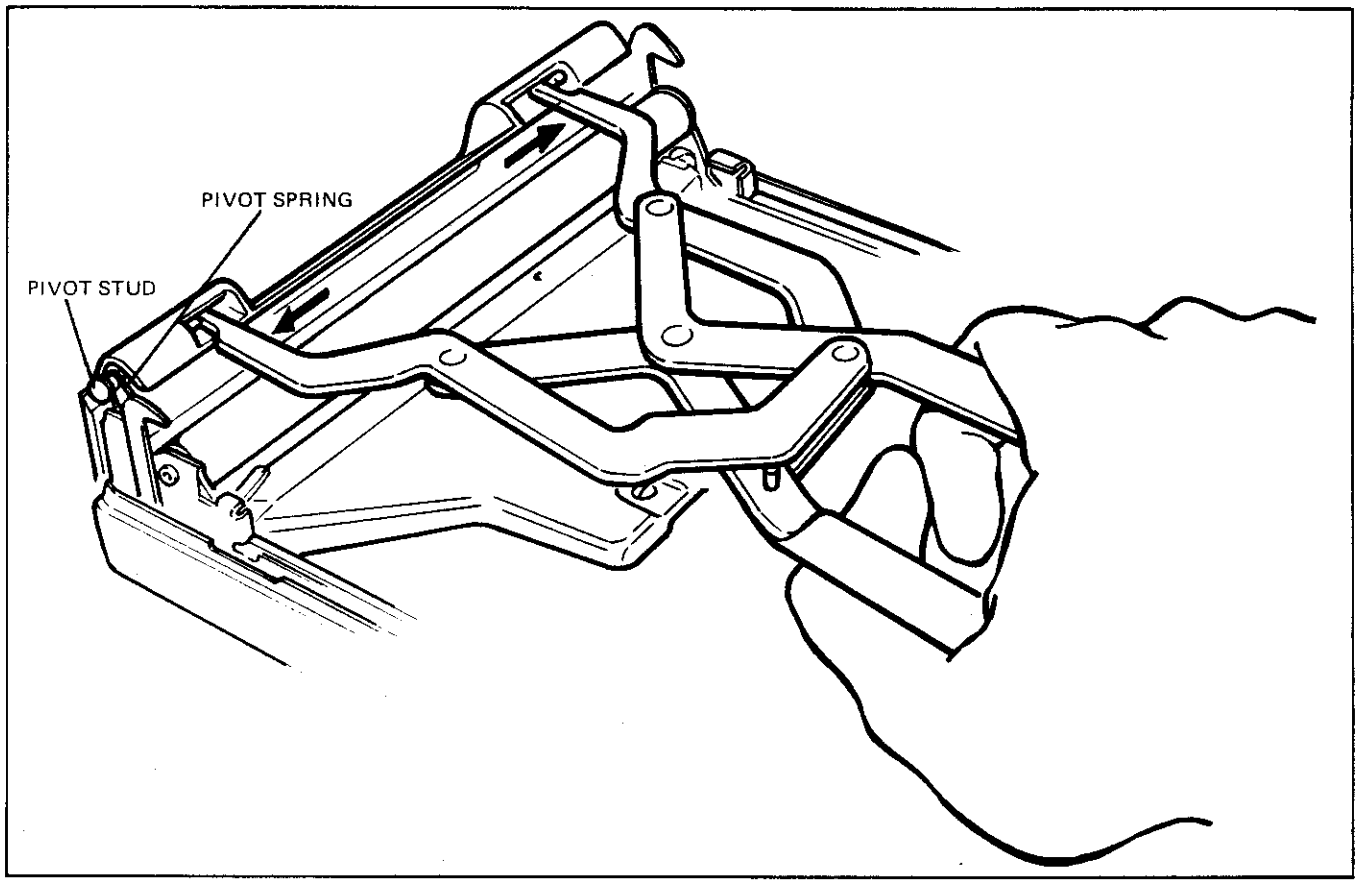


FIG. 5.1 REMOVING THE EXIT DOOR

EXIT DOOR REPLACEMENT

Removal

1. Open the rear door.
2. Position tool #169455 against the pivot studs as shown in Figure 5-1). Squeeze the tool handle until the pivot studs pop loose.
3. Remove the pivot studs using pliers. Save the pivot studs and pivot spring for reuse.

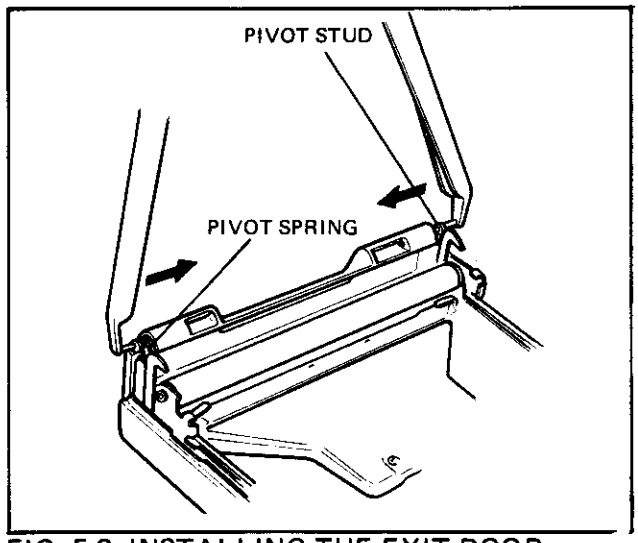


FIG. 5.2 INSTALLING THE EXIT DOOR

Replacement

1. Align the exit door in the frame and insert the pivot spring and pivot studs.
2. Secure the pivot studs using tool #169455 (Figure 5-2).

SLIDE BLOCK REPLACEMENT

Removal

1. Open the rear door, remove the three slide block cover retaining screws and swing the cover out of the way.
2. Slide the shaft out of the edge control bar and remove the edge control bar and two springs.
3. Unhook the spring from the slide block, allowing the slide block to slide free of the frame roller support. Remove the spring.

Replacement

1. Hook one end of the spring in the notch on the slide block (Figure 5-3). Position the slide block and spring in the frame roller support and hook the spring in the support eyehole.
2. Replace the edge control bar (see Figure 5-4). Slide the shaft in the edge control bar

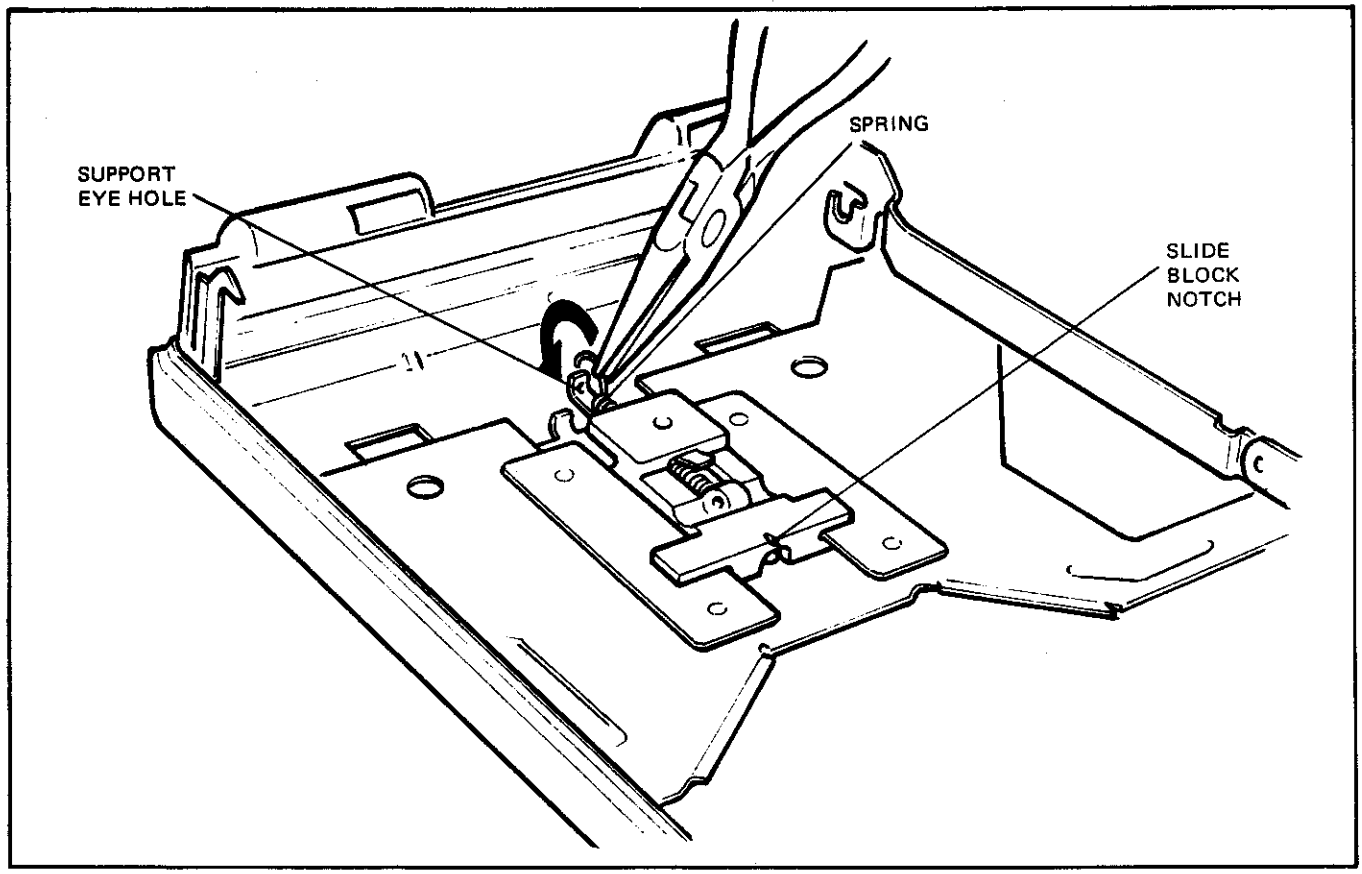


FIG. 5.3 INSTALLING THE SLIDE BLOCK SPRING

slot and install one spring on the shaft at the inboard side of the bar. Insert the shaft through the slide block. Install the remaining spring on the shaft and slide the shaft through the other slot in the edge control bar.

3. Swing the cover over the slide block and replace the three retaining screws. **CAUTION**: BE SURE THE SHAFT DOES NOT JAM UNDER THE SLIDE BLOCK COVER.

SPREAD ROLL SPRING REPLACEMENT

Removal

1. Open the rear door, unlatch the rollers and remove the rear roll (Figure 5-5): Hold the frame roller support and press firmly against the rear roll. Apply an upward force against one end of the roll until the roll and bushings disengage from the support.

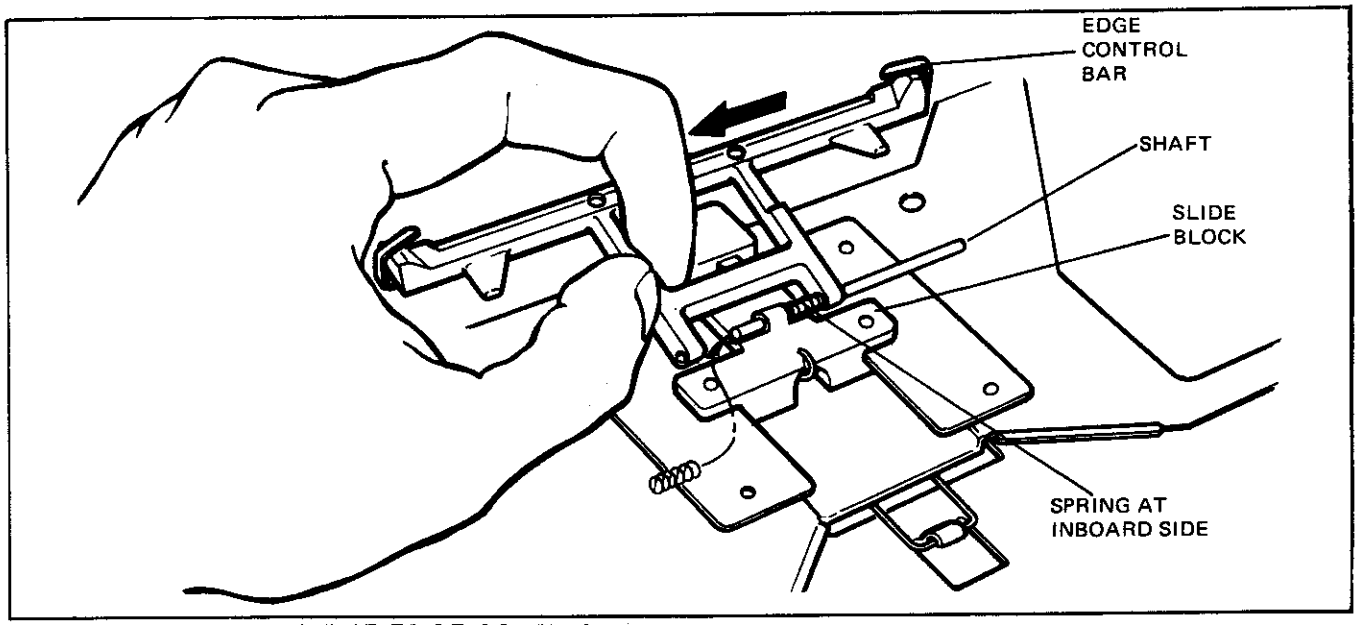


FIG. 5.4 REPLACING THE EDGE CONTROL BAR

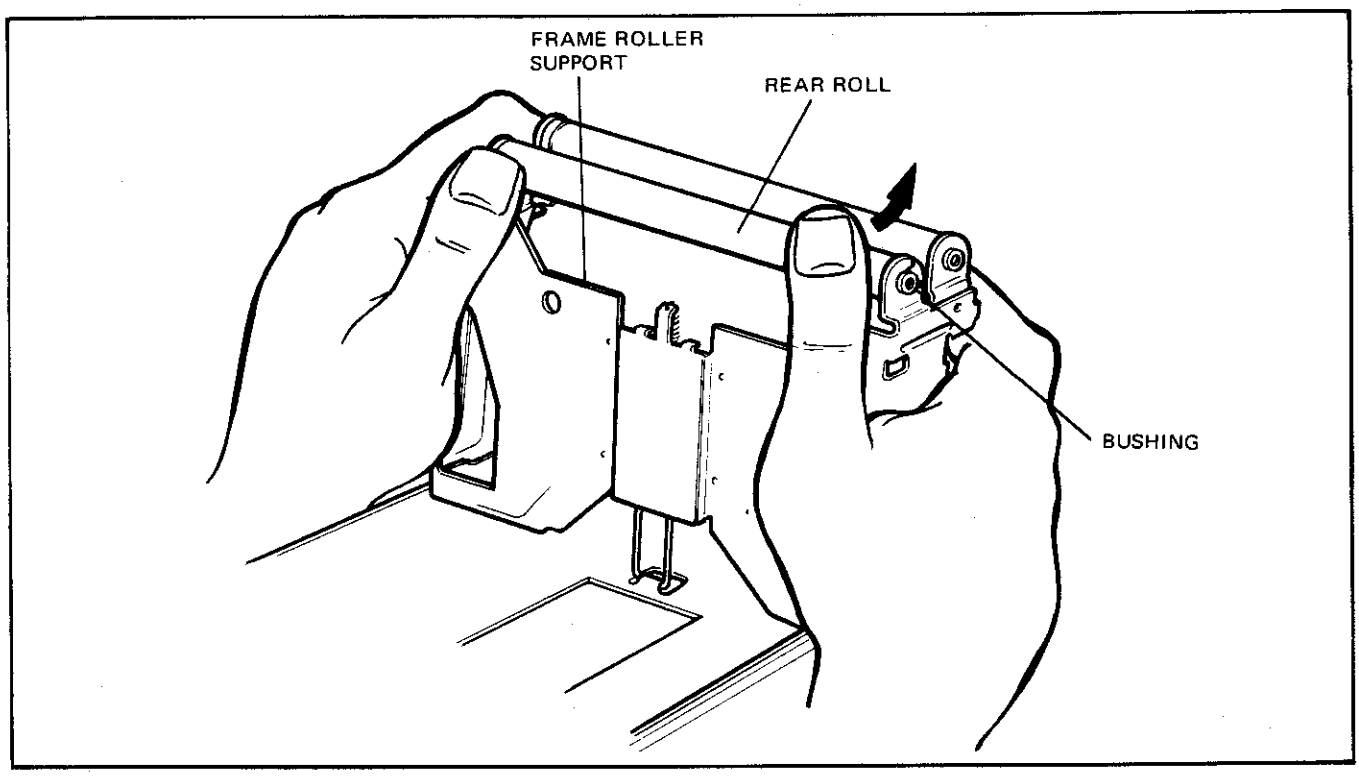


FIG. 5.5 REMOVING THE REAR ROLL

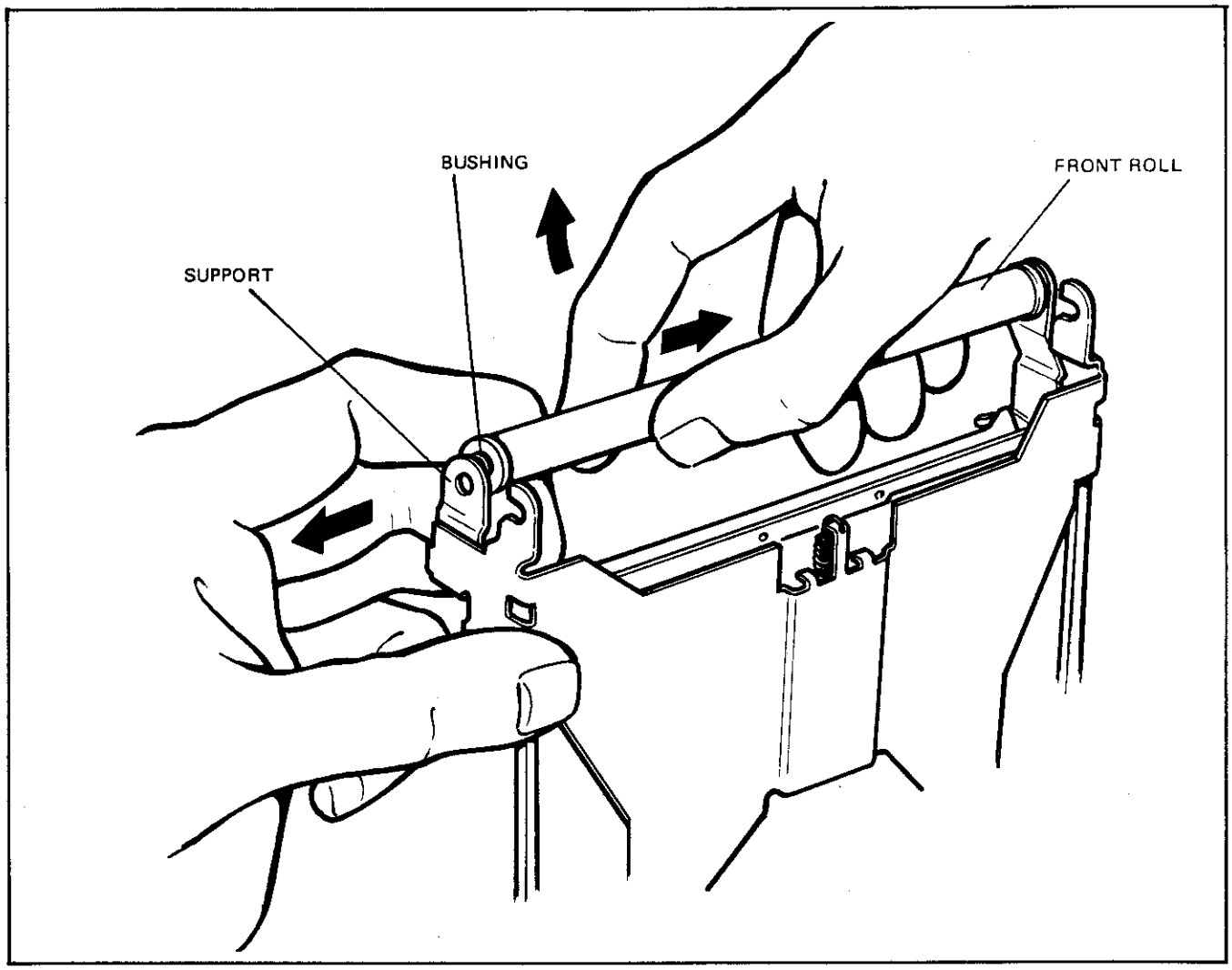


FIG. 5.6 REMOVING THE FRONT ROLL

2. Remove the front roll (Figure 5-6): Grip the roll firmly and pull it against one of the supports. Apply a force in the opposite direction against the other support until the roll and bushing disengage from the support.
3. Remove the spread roll spring (Figure 5-7): Compress the spring and force it toward the center of the frame roller support until it disengages from the support tab. Hold the spring near the radius and pull down and out until it is free.

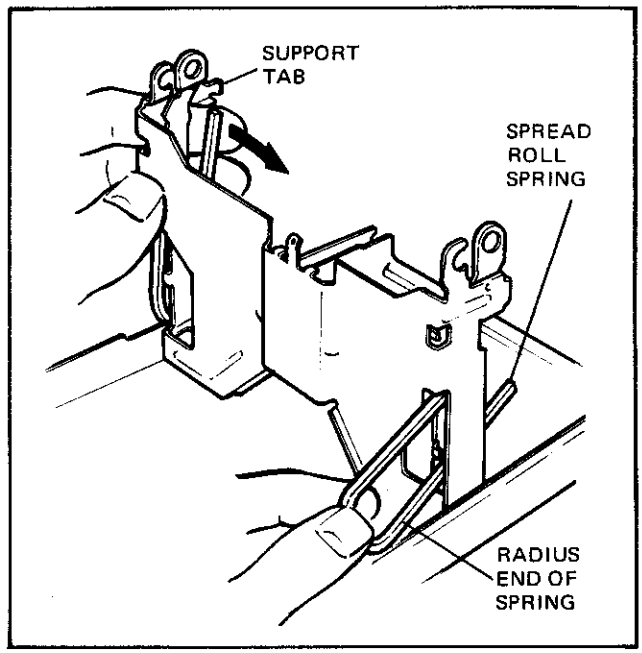


FIG. 5.7 REMOVING THE SPREAD ROLL SPRING

Replacement

NOTE: Model 100 cameras serially numbered 129000 to 178000 should be examined to determine if they have the proper spread roll springs. (If there are blue bushings on the front roll, the camera has already been checked.) If the outside surfaces of the spring are not flat, replace them. Install blue bushings #168072 (if they are availa-

ble) on the front roll, indicating the modification has been done.

1. Replace the spread roll spring (Figure 5-7): Hold the radius end of the spring and insert the spring in the frame roller support so that the lower end of the spring seats on the front roll support tab. Apply a downward pressure on the upper end of the spring and force the spring under the frame roller support tab.
2. Replace the front (shouldered) roll: Place the roll bushings on the roll and insert one end of the roll in either support. Spread the other support far enough to insert the roll. Check the end-to-end play of the roll in the supports. This side movement must not exceed .020 inch. If it does, remove the roll and toe in the front roll supports. Re-install the roll and recheck.
3. Replace the rear roll: Place the roll on top of the front roll and line up the bushings with the openings in the support. Press down firmly until one end of the roll snaps into position in the support. Press down at the other end until the roll is engaged in the support.

SHUTTER HOUSING REPLACEMENT

Removal

1. Remove the front shutter housing and the base block and electronic module as follows:

a. Extend the bellows to detent lock-in.

b. Remove the shutter housing screws (including the housing screw at the top of the cable release cover) located on the bellows-side of the rear shutter housing using screwdriver #11040. (On cameras where applicable, release the front shutter housing from the top etch plate. If the etch plate is damaged or has lost its adhesiveness, discard it.)

c. Where applicable, remove the base block and electronic module mounting screws holding the shutter to the front shutter housing. (On some cameras, the shutter simply rests on plastic posts.)

d. **On shutters with copper-colored mylar printed circuits**: Note the positions of the black and white battery wire leads. Using an Ungar "solder gobbler" (or equivalent), carefully unsolder the two leads. Cut off and save the rubber strain-relief collar (slit the collar and peel it off the cable) and draw the battery wire through the opening in the rear shutter housing. **On shutters with clear teflon printed circuits (older Model 100 cameras)**: DO NOT UNSOLDER THE BATTERY LEADS FROM THE CIRCUIT! Open the battery compartment and unsolder the black battery lead from the shutter interlock. Snip the white lead about an inch away from the battery terminal. Remove and retain the metal banding clip and draw the battery wire through the bellows tabs and the opening in the rear shutter housing. **On other shutters**: Unsolder the battery leads directly from their contacts on the electronic module, cut the collar (slit the collar and peel it off the cable) and draw the wire through the opening in the shutter housing.

2. Loosen the cable release cover retaining screws and free the cable release from the rear shutter housing. (Refer to Figures 5-21 and 5-22 for the following steps.)

3. To remove the inner frame (top) from the shutter housing, remove the detent from the detent stud using smooth edged pliers. (The detent is press-fitted on the stud.) Then unscrew the detent stud from the shutter shaft, thus releasing the inner frame (top).

4. To remove the inner frame (bottom) from the shutter housing, remove the shutter shaft screw and the two washers (if present) from the shutter mount. Next remove the shutter shaft and sleeve (if present) from the housing.

5. Release the U-frame from the shutter housing by sliding the bushing out of the keyhole. Release the spring from the shutter mount.

6. Collapse the bellows and remove the rear shutter housing from the bellows as follows (retain the light seal).

Models 100, 240, 250, 350 & 360:

Remove the four bellows screws.

All Other Models:

Remove the four bellows fasteners using tool #11006 (Figure 5-8). (Some newer model

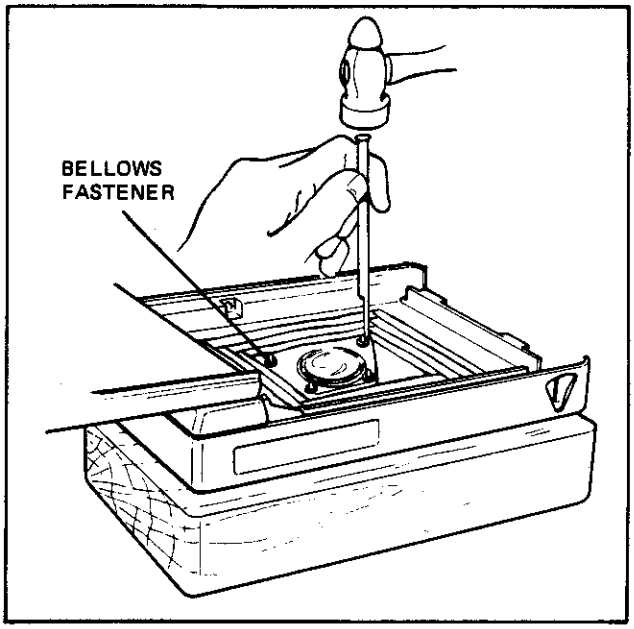


FIG. 5.8 REMOVING THE BELLOWS FASTENERS

cameras may have retaining rings which can be removed using tweezers.)

Replacement

1. Secure the new rear shutter to the bellows as follows (replace the light seal):

Models 100, 240, 250, 350 & 360:

Replace the four bellows screws.

All Other Models:

Replace the four bellows fasteners using tool #11050. (Use tweezers to replace retainer rings.) Insert the fastener in the tool and hand-press it in place on the posts (Figure 5-9). (If a post breaks, modify the camera according to the instructions contained in the "Bellows Replacement" procedure.)

2. Extend the bellows and secure the U-frame to the shutter housing by sliding the bushing into the keyhole. Hook the smaller loop-end of the spring onto the bushing.
3. Insert the sleeve on the shutter shaft (if present) and slide the shaft into the housing. Then secure the inner frame (bottom) to the shutter shaft by replacing the shutter shaft screw and the two washers (if present). Hook the spring around the shutter shaft.
4. Apply Loc-Tite cement sparingly to the detent stud and secure the inner frame (top) to the shutter shaft. Position the detent on the detent stud so that the notched side is

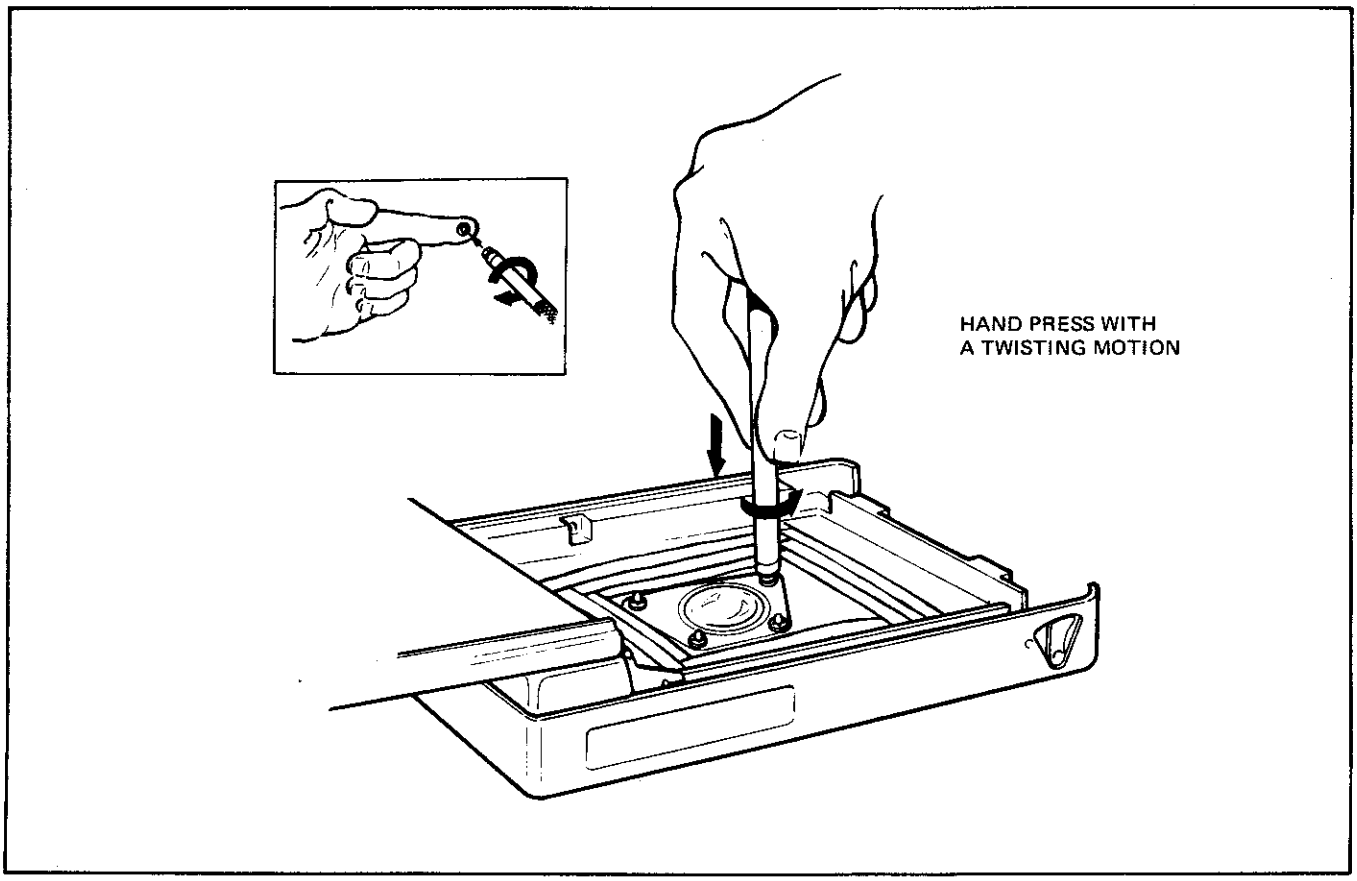


FIG. 5.9 INSTALLING NEW FASTENERS

facing away from the bellows and hand-press it in place.

5. Install the baseplate into the shutter housing and then install the shutter housing as follows:

a. **On shutters with copper-colored mylar printed circuits**: Route the battery cable through the opening in the rear shutter and reinstall the rubber strain relief collar using Pliobond (or equivalent). Using an Ungar Princess soldering iron (or equivalent), carefully solder the battery wires to their contacts on the printed circuit. **On shutters with clear teflon printed circuits (older Model 100 cameras)**: Position the shutter in the rear shutter housing, routing the battery cable through the opening in the housing and then through the bellows tabs. Replace the metal banding clip and solder the black lead to the shutter interlock. Strip the insulation from the cut ends of the white wire and slide a piece of heat-shrink tubing down one length of the white wire. Solder the two ends of the white wire together and slide the heat-shrink tubing over the splice. Apply heat to tighten the tubing. **On other shutters**: Draw the battery cable through the opening in the shutter housing and reinstall the rubber strain-relief collar using Pliobond. Solder the battery cable leads to their contacts on the electronic module.

b. Secure the base block and electronic module to the front shutter housing with the mounting screws. (On some cameras the shutter is positioned over plastic posts on the front shutter housing.)

c. Cock the shutter and move the slide block on the rear shutter housing all the way down. Very carefully position the shutter into the rear housing. Be sure the shutter gasket is in place on the rear housing. Secure the front housing to the rear housing with the shutter housing screws. Use screwdriver #11040. Do not tighten the housing screw located at the top of the cable release cover. (On cameras where applicable, install the top etch plate.)

6. Position the cable release in its cover on the rear shutter housing and tighten the three screws.

7. Check the action of the shutter release button according to procedures in Section III.

8. Perform the lens and rangefinder/viewfinder checks described in Section III.

BELLOWS REPLACEMENT

Removal

1. Carefully peel the battery cable tabs free of the bellows.

2. Loosen the cable release cover, freeing the cable from the rear shutter housing.

3. Remove the bellows from the rear shutter housing as follows: (Retain the light seal if it is in good condition).

Models 100, 240, 250, 350 & 360:

Remove the four bellows screws.

All Other Models:

Carefully remove the four bellows fasteners using tool #CR1006 (Figure 5-8). If any of the plastic posts on the housing break, repair them as follows:

a. File the broken post until it is flush with the bellows plate.

b. Set the drill to the correct height by inserting the drill in jig #CR1025 and adjusting the set screw in the collar until the drill pro-

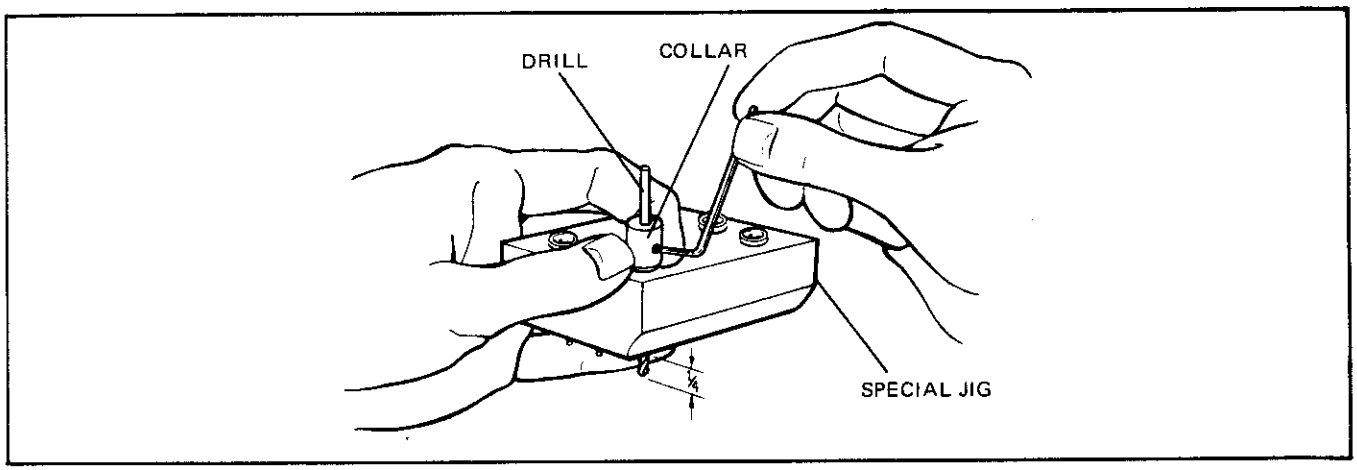


FIG. 5.10 PREPARING THE DRILL

trudes 1/4" from the bottom of the jig (Figure 5-10).

c. Place the camera on support block #CR-1000A and position the jig over the bellows plate as shown in Figure 5-11. Locate the drill in the bushing and drill the housing by rotating the collar back and forth in your fingers.

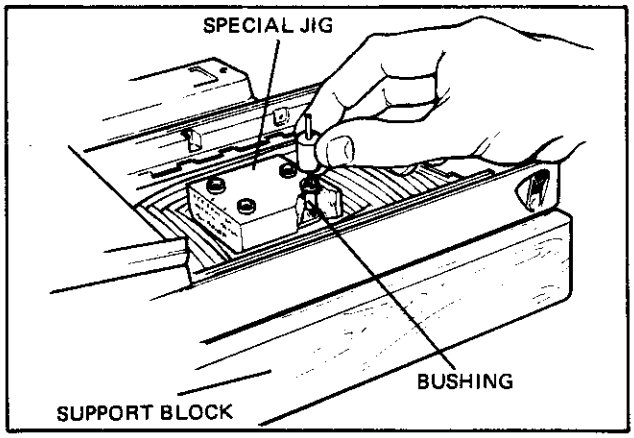


FIG. 5.11 DRILLING OUT THE POST

4. Remove the bellows from the body by carefully prying the bellows tabs free using tool #169447 (Figure 5-12). Retain the light seal if it is in good condition.

Replacement

1. Position the light seals over the bellows. If the old light seals are damaged, replace them. (The paper side of the rear light seal should be placed against the bellows.)
2. Remove the two tabs (from the new bellows) which would normally hold the battery cable and position the bellows on the camera body so the seam is at the bottom.
3. Secure the bellows to the body by carefully bending the tabs back using tool #169447 (Figure 5-13). Be sure you do not damage the bellows or the camera body.
4. Position the tabs on the battery cable over the proper area of the new bellows and adhere them to the bellows using Pliobond.
5. Secure the bellows to the rear shutter housing:

Models 100, 240, 250, 350 & 360:

Replace the four bellows screws.

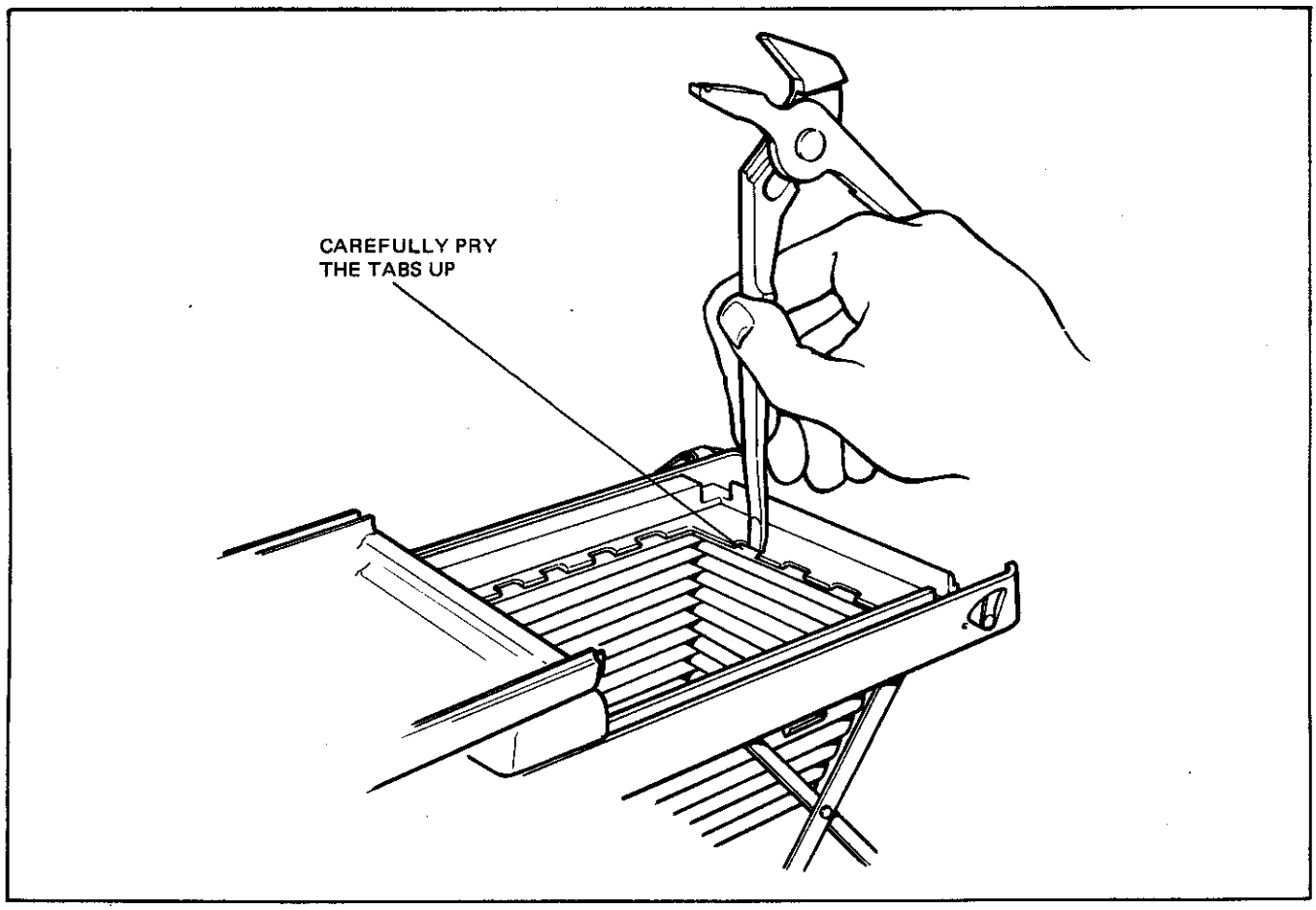


FIG. 5.12 PRYING THE BELLOWS TABS

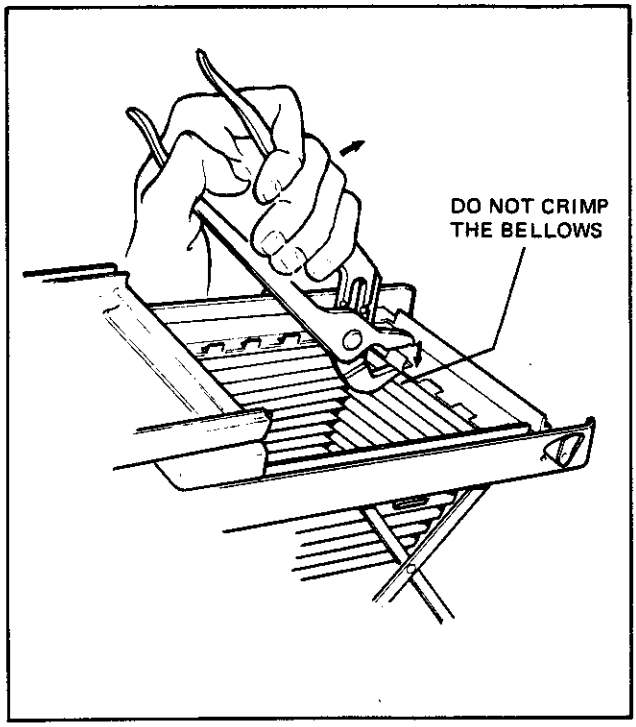


FIG. 5.13 INSTALLING THE BELLOWS

All Other Models:

Replace the four bellows fasteners using tool #CR1002. Insert the fastener in the tool and handpress in place on the posts (Figure 5-9). Use a 1/4" #4 pan-head self-tapping screw if a post was repaired.

6. Position the tip of the cable release in the cover. Tighten the cable release cover using the fastening screws.
7. Work the erecting system a few times and check the action of the bellows.

FRONT LENS REPLACEMENT

Removal

Models 100, 101, 102, 240, 250, 350 & 360:

1. Remove the front lens assembly from the camera using tool #169446. Position the tool in the lens mount and squeeze the handle until the head is firmly against the mount (Figure 5-14). Rotate the handle **counterclockwise** until the lens assembly is free.

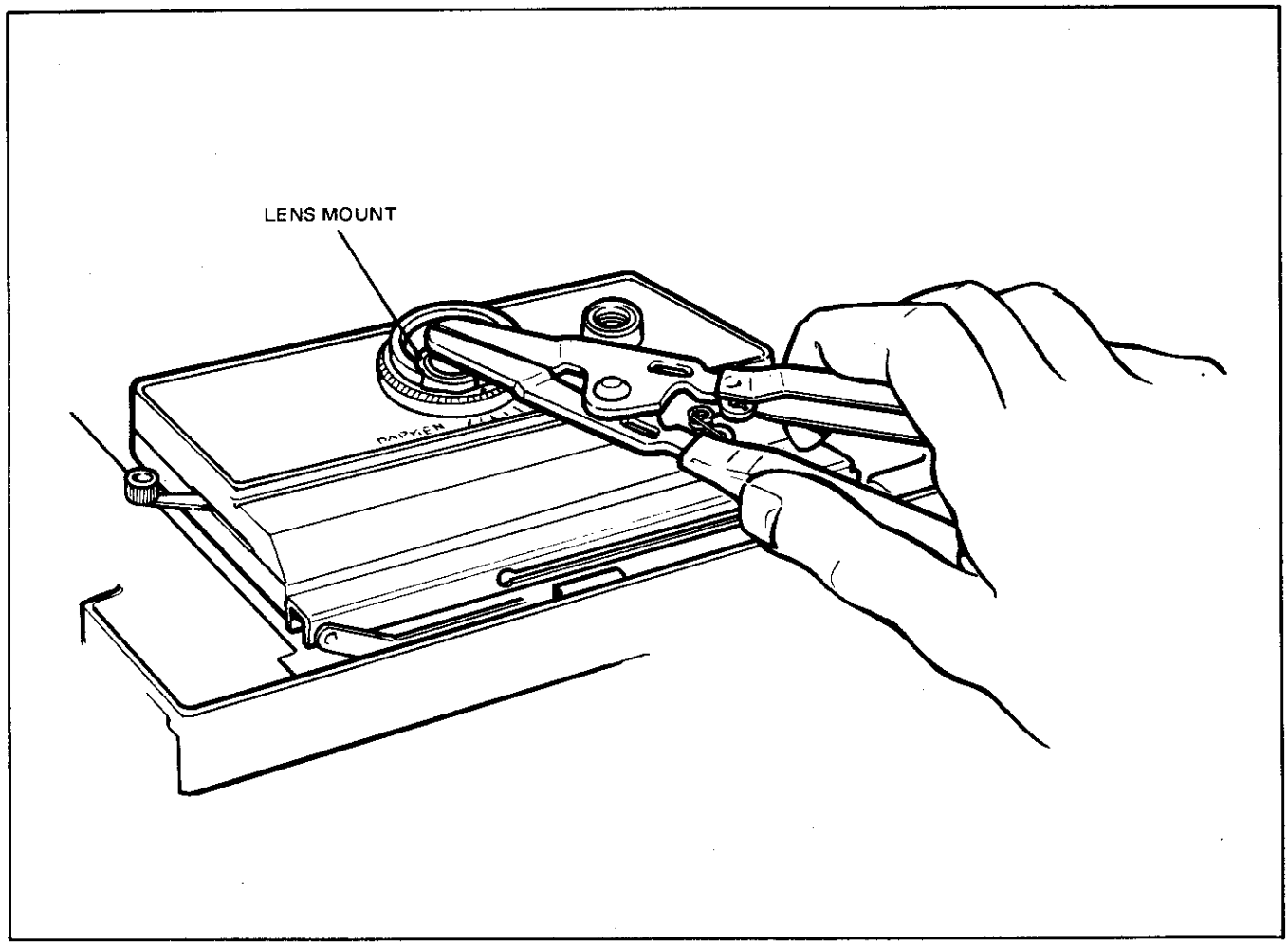


FIG. 5.14 REMOVING THE FRONT LENS - METAL SHUTTER HOUSING

2. Use methanol to loosen the bond between the front lens element and rear lens element. Place the lens mount in lens nest #11394 and using tool #169446, separate the two lens elements (Figure 5-54). **CAUTION**: DO NOT DAMAGE THE SCREW THREADS.

Models 103, 135, 230, 330, 335 & 340:

1. Disassemble the front shutter housing from the shutter assembly. (Refer to procedure: "Shutter Housing Replacement".)
2. Remove the front lens assembly from the camera using tool #169446. Position the tool in the lens mount and squeeze the handle until the head is firmly against the mount (Figure 5-15). Rotate the handle **counterclockwise** until the lens assembly is free of the lens retainer.
3. Use methanol to loosen the bond between the front lens element and rear lens element. Place the lens mount in lens nest #11394 and using tool #169446, separate the lenses. Avoid damaging the screw threads on the lens. Save the lens retainer for reuse.

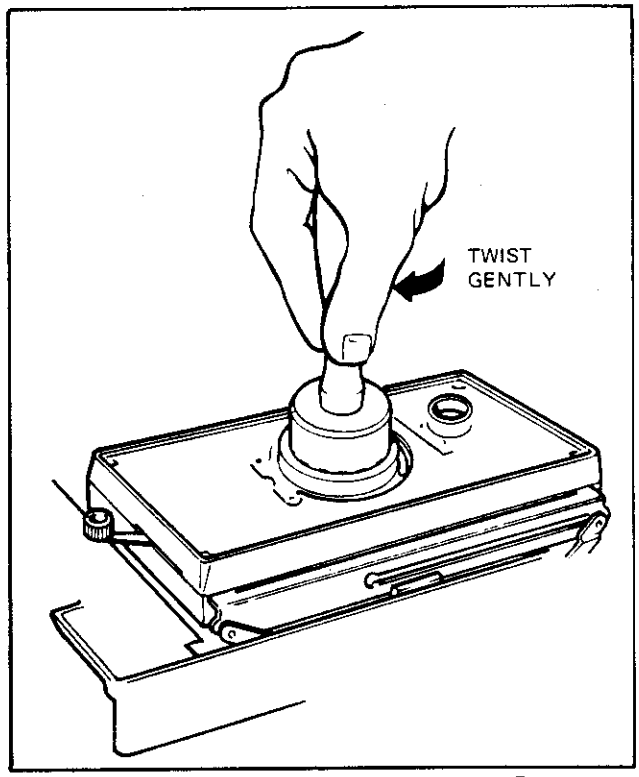


FIG. 5.16 REMOVING LENS RETAINER

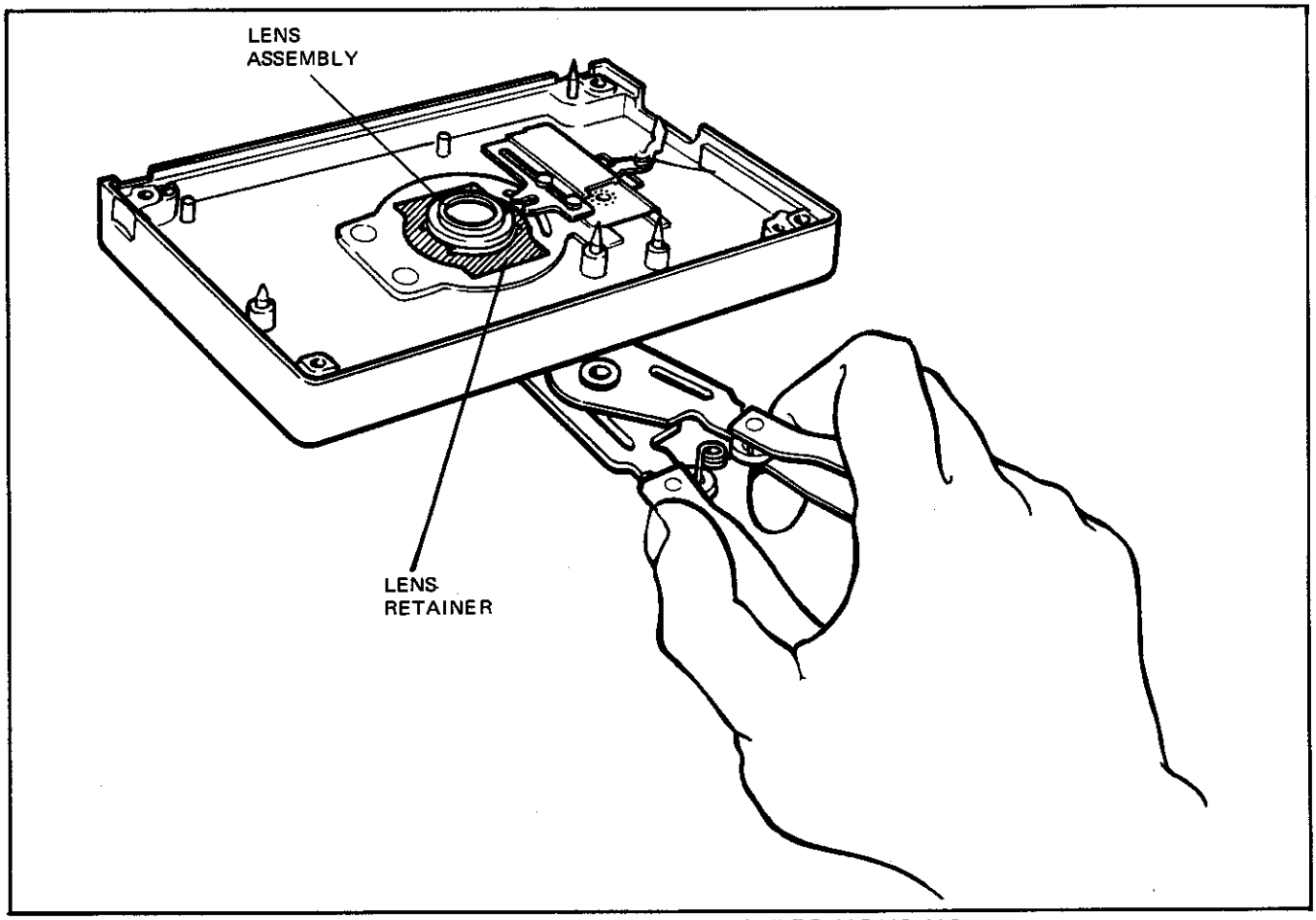


FIG. 5.15 REMOVING THE FRONT LENS - PLASTIC SHUTTER HOUSING

Models 104, 125, 210, 215, 220, 225, 315 & 320 (Duplet Lenses):

1. Remove the front etch plate: Pry one edge free using a fine blade tool, then peel the plate free using pliers. Discard the plate.
2. Remove the lens retainer using tool #CR-1000 (Figure 5-16). Position the tool over the retainer and twist gently until it is free. The lens may now be removed.

Replacement

Models 100, 101, 102, 240, 250, 350 & 360:

1. Insert the rear element lens assembly in the casting using tool #169446.
2. Loosely assemble the front element lens to the rear element.
3. Collimate the lens as instructed in Section III.

Models 103, 135, 230, 330, 335 & 340:

1. Position the lens retainer in the housing so that the bowed side is toward the housing. Hand tighten the rear element lens assembly into the lens retainer. Secure it in place using tool #169446.
2. Loosely assemble the front element lens to the rear element. Assemble the front shutter housing to the shutter assembly. (Refer to procedure "Shutter Housing Replacement.")
3. Collimate the lens as indicated in Section III. Section III.

Models 104, 125, 210, 215, 220, 225, 315 & 320 (Duplet Lenses):

CAUTION: Before installing the front lens on these cameras, you must determine whether the rear lens is a Polaroid or an American Optical. Gage #CRG001 is designed to identify the lenses.

1. TO USE THE GAGE:

a. Pull the black scale up until it no longer protrudes at the bottom.

b. Position the gage over the rear lens as shown in Figure 5-17.

c. Slide the scale down until it touches the lens.

d. Read the scale to identify the lens. (If the scale is at the yellow line, the lens is an American Optical. Otherwise the lens is a Polaroid.)

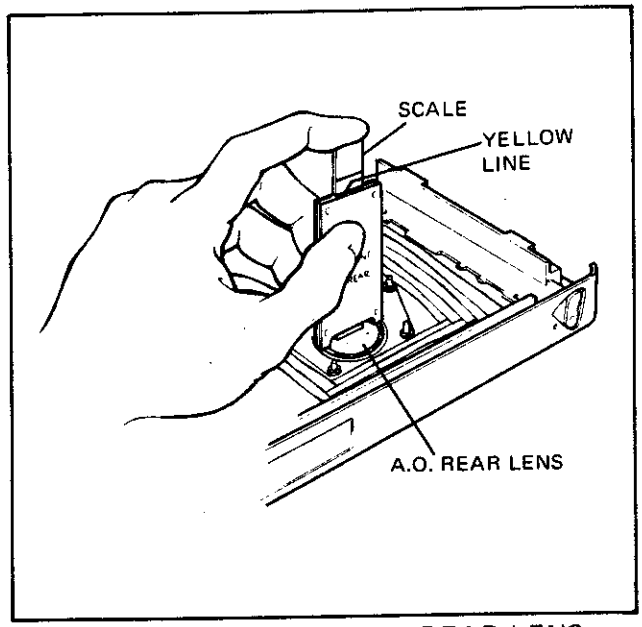


FIG. 5.17 IDENTIFYING THE REAR LENS

If it is determined that the rear lens is a Polaroid, then the front lens must be replaced with a front Polaroid lens. If the rear lens is an American Optical, then the front lens must be replaced with another American Optical lens. Further, it should be remembered that Polaroid lenses are not interchangeable between front and rear, while American Optical lenses are identical.

Polaroid lenses can be matched to front or rear by identification marks molded into the lenses as shown below.

FRONT LENS F-xx R-xx REAR LENS

2. TO REPLACE THE LENS:

a. Insert the new front lens in the housing. Position the lens retainer over the lens so that the teeth are facing up. Tighten the retainer in place using tool #CR1000.

b. Replace the bezel and bezel friction spring in the housing. Apply Pliobond cement sparingly to the front etch plate and secure it on the housing.

c. Check the lens collimation as instructed in Section III.

REAR LENS REPLACEMENT

Removal

Models 100, 240, 250, 350 & 360:

1. Disassemble the shutter housing to the point where the rear lens retainer is accessible. (Refer to procedure: "Shutter Housing Replacement.")

2. Insert tool #169456 over the lens retainer and twist gently until the retainer is free (Figure 5-18).

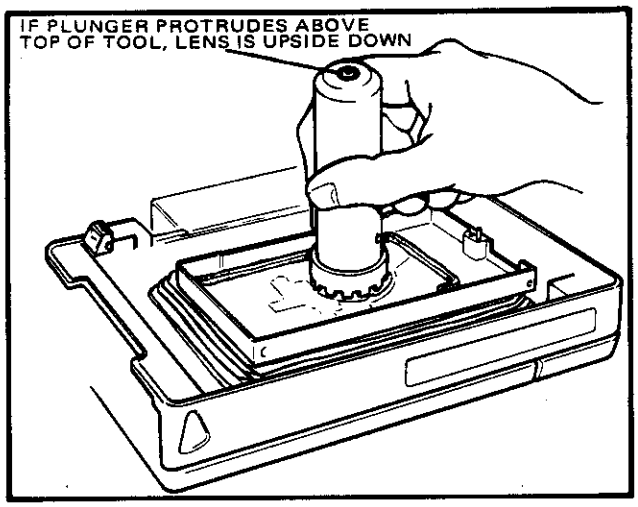


FIG. 5.18 REMOVING REAR LENS - METAL SHUTTER HOUSING

Models 101, 102, 103, 135, 230, 330, 335 & 340:

1. Disassemble the rear shutter housing from the shutter assembly. (Refer to procedure: "Shutter Housing Replacement.")
2. Remove the three rear lens mounting plate rivets by grinding off the flared portion of the rivets using a Dremel Mfg. Co. Moto Tool and a No. 107 cutter (or equivalent).

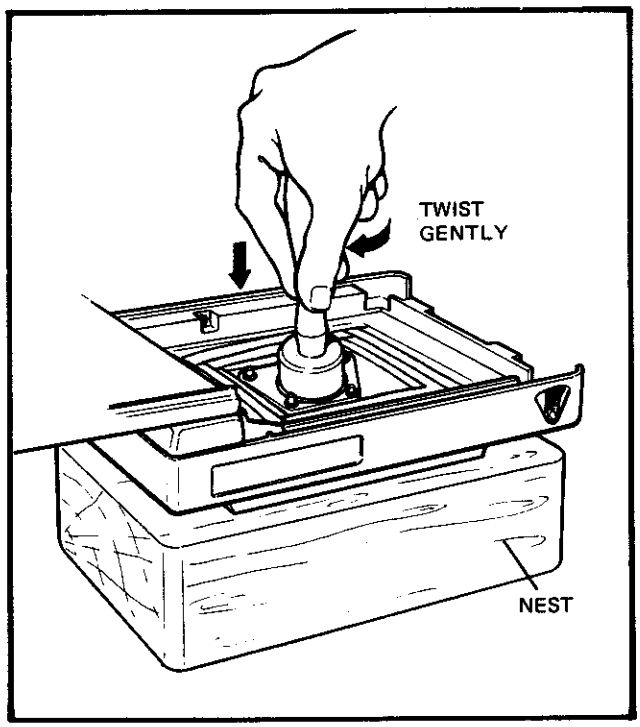


FIG. 5.19 REMOVING REAR LENS - PLASTIC SHUTTER HOUSING

Models 104, 125, 210, 215, 220, 225, 315 & 320 (Duplet Lenses):

1. Seat the camera in nest #CR1000A and open the rear door.
2. Insert tool #CR1000 over the lens retainer and twist gently until the retainer is free (Figure 5-19).

Replacement

Models 100, 240, 250, 350 & 360:

1. Insert the new rear lens in the casting so the heavier convex side is positioned toward the bellows. This can be checked by positioning tool #169456 over the lens and checking to see if the plunger protrudes above the top of the tool (Figure 5-18). If the plunger does protrude, the lens is inserted upside down.
2. Position the retainer over the lens and secure in place using tool #169456.
3. Check the lens collimation as instructed in Section III.

Models 101, 102, 103, 135, 230, 330, 335 & 340:

1. Insert the new rear lens in the housing so the heavier convex side is facing down. This can be checked by positioning tool #169456 over the lens and checking if the plunger protrudes above the top of the tool (see Figure 5-18). If the plunger protrudes, the lens is inserted upside down.
2. Position the mounting plate over the lens and replace the rivets using Universal Riveter tool #120507.
3. Assemble the rear shutter housing. (Refer to procedure: "Shutter Housing Replacement.")
4. Check the lens collimation as instructed in Section III.

Models 104, 125, 210, 215, 220, 225, 315 & 320 (Duplet Lenses):

CAUTION: Before installing the rear lens on these cameras, you must determine whether the front lens is a Polaroid or an American Optical. Gage #CRG001 is designed to identify the lenses.

1. **TO USE THE GAGE:**

a. Pull the black scale up until it no longer protrudes at the bottom.

b. Position the gage over the front lens as shown in Figure 5-20.

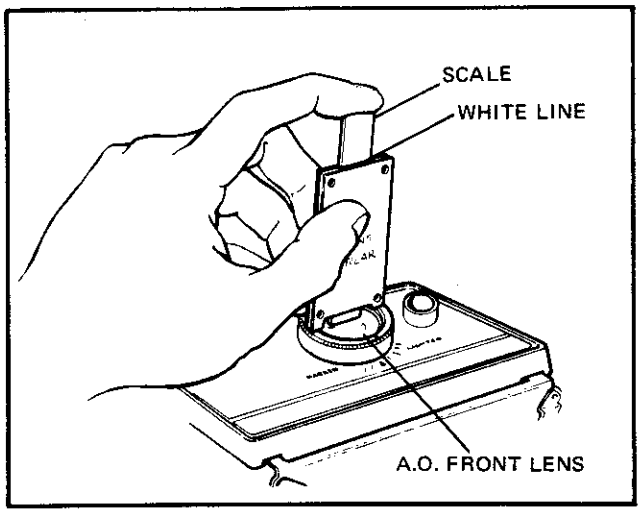


FIG. 5.20 IDENTIFYING THE FRONT LENS

c. Slide the scale down until it touches the lens.

d. Read the scale to identify the lens. (If the scale is at the white line, the lens is an American Optical. Otherwise the lens is a Polaroid.)

If it is determined that the front lens is a Polaroid, then the rear lens must be replaced with a rear Polaroid lens. If the front lens is an American Optical, then the rear lens must be replaced with another American Optical lens. Further, it should be remembered that Polaroid lenses are not interchangeable between front and rear, while American Optical lenses are identical.

Polaroid lenses can be matched to front or rear by identification marks molded into the lenses as shown below.

FRONT LENS (F-XX) (R-XX) REAR LENS

2. **TO REPLACE THE LENS:**

a. Insert the new rear lens in the housing. Position the lens retainer over the lens so that the teeth are facing up. Tighten the retainer in place using tool #CR1000.

b. Check lens collimation as instructed in Section III.

LENS BEZEL REPLACEMENT

Plastic Body Cameras:

Removal

Removing the front etch plate allows the bezel to be removed. (On cameras with duplet lenses, the bezel is a one-piece unit. On cameras with triplet lenses, the bezel assembly consists of a set of rings and a compression spring.

Replacement

Align the post on the bezel over the slot in the cell wedge. The friction spring should hold the bezel firmly. Before installing the etch plate, turn the bezel and observe that the cell wedge moves. Install a new front etch plate.

Metal Body Cameras:

Removal

1. Remove front etch plate.
2. Remove the three slotted screws holding the bezel assembly in place and remove the bezel assembly.

Replacement

1. Align the bezel assembly so the post fits into the slot in the cell wedge. The friction spring should hold the bezel firmly.
2. Install the three slotted screws holding the base of the bezel.
3. Turn the bezel to be sure the cell wedge moves up and down over the photocell.
4. Install a new front etch plate.

FLASH FILTER AND CELL WEDGE REPLACEMENT

Removal

1. Remove the front shutter housing from the camera.
2. Remove the front etch plate.
3. Drive out the two cell wedge rivets and remove the cell wedge.
4. Drive out the actuating arm pivot pin after removing the retaining ring and spring from the actuating arm. Remove the actuating arm and flash filter as one piece.

Replacement

1. Position the actuating arm and flash filter on the front shutter housing and install a new actuating arm pivot pin.
2. Replace the spring and retaining ring on the pivot pin.
3. Position the cell wedge over the flash filter, carefully aligning the slots. The cutout on the cell wedge must fit over the post of the lens bezel assembly. Install two new cell wedge rivets.
4. Push the actuating arm a few times to be sure there are no binds in the action of the assembly. Turn the lens bezel a few times

to be sure the cell wedge moves smoothly.

5. Install a new front etch plate.
6. Assemble the front shutter housing to the camera.

PHOTOCELL LENS REPLACEMENT

Plastic Body Cameras:

If the photocell lens or lens bezel must be replaced in plastic body cameras, it is necessary to replace the entire front shutter housing.

Metal Body Cameras:

Removal

1. Remove the front shutter housing from the camera as instructed previously.
2. Remove the front etch plate.
3. Remove the flash filter and cell wedge (see procedure: "Flash Filter and Cell Wedge Replacement").
4. Break off the flared portion of the cell lens mount holding the lens assembly to the shutter housing. Remove the lens, lens retainer, lens mount, and wave washer.

Replacement

1. Assemble the lens, lens retainer, lens mount and wave washer. Insert them into the opening in the shutter housing and flare back the lens mount with a soldering iron.
2. Replace the flash filter and cell wedge.
3. Install a new front etch plate.
4. Assemble the front shutter housing to the camera.

FOCUS BAR REPLACEMENT

Removal

1. Remove the link pivot holding the inner frame (top) and the U-frame using tool #11026 (Figure 5-21). Discard the spacer.

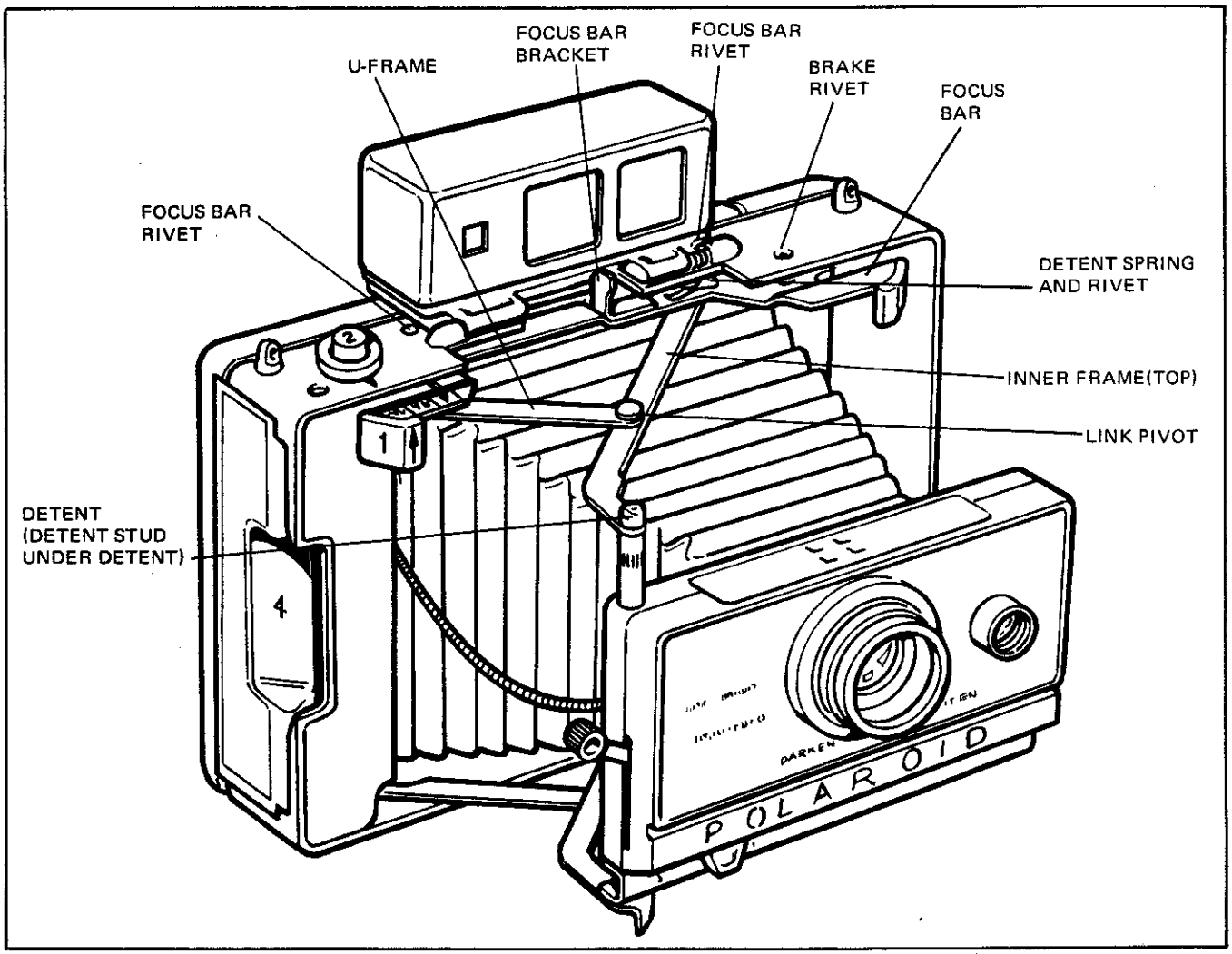


FIG. 5.21 REMOVING THE FOCUS BAR AND INNER FRAME

2. Remove the detent from the detent stud using smooth-edged pliers.
3. Unscrew the detent stud from the shutter shaft, releasing the top inner frame.
4. Remove the brake rivet and the two focus bar rivets as follows:

All Metal Body Cameras:

Remove the rivets using tool #11016.

Plastic Body Cameras

Models 103, 104, 125, 135, 210, 215, 230, 315 & 340:

Grind off the flared portion of the rivets using a Dremel Mfg. Co. Moto Tool and No. 107 cutter (or equivalent). Carefully tap out the rivets using a 1/16" drive pin punch and remove the brake spring, sleeves and washers.

Models 220, 225, 320, 330 & 335:

a. Remove the RF/VF: Unscrew the Phillips-head (back) mounting screw. Unscrew the two hex head (front) mounting screws using tool #11092. (Use tool #11093 for cameras having Phillips-head [front] mounting screws.)
b. Grind off the flared portion of the rivets using a Dremel Mfg. Co. Moto Tool and No. 107 cutter (or equivalent). Carefully tap out the rivets using a 1/16" drive pin punch and remove the brake spring, sleeves and washers.
5. Remove the focus bar.

Replacement

1. Slide the new focus bar assembly into the body and install the three rivets and hardware previously removed using tool #11016. (Replace RF/VF if it was removed.) **BE SURE THE RF CAM IS NOT POSITIONED BEHIND THE FOCUS BAR BRACKET.**
2. Apply Loc-Tite cement sparingly to the detent stud and secure the top inner frame to the shutter shaft.
3. Position the detent on the detent stud so the notched side is toward the lens and hand-press it in place.
4. Insert a new spacer between the inner frame (top) and the U-frame and install a link pivot using tool #11220. Work the focus bar a few times to be sure that the linkage does not bind.
5. Perform the applicable RF/VF checks described in Section III.

INNER FRAME (TOP) REPLACEMENT

Removal

1. Unrivet the link pivot holding the top inner frame to the U-frame (Figure 5-21) using tool #11026. Discard the spacer.
2. Remove the detent from the detent stud using smooth edged pliers. The detent is press-fitted on the stud.
3. Unscrew the detent stud from the shutter shaft and lift off the inner frame.
4. Loosen the focus bar from the body:

Models 100, 101, 102, 240, 250, 350 & 360

Remove the two focus bar rivets using tool #169454.

Models 103, 104, 125, 135, 210, 215, 230, 315 & 340

Grind off the flared portion of the two focus bar rivets using a Dremel Mfg. Co. Moto Tool and No. 107 cutter (or equivalent). Carefully tap out the rivets using a 1/16" drive pin punch. Use **extreme care in removing these rivets.**

Models 220, 225, 320, 330 & 335

a. Remove the RF/VF: Unscrew the Phillips head (back) mounting screw. Unscrew the two hex head (front) mounting screws using tool #11092. (Use tool #11093 for cameras having Phillips head [front] mounting screws).
b. Grind off the flared portion of the two focus bar rivets using a Dremel Mfg. Co. Moto Tool and No. 107 cutter (or equivalent). Carefully tap out the rivets using a 1/16" drive pin punch.
5. Slide the focus bar to INFINITY and pivot the focus bar forward approximately 1/2" away from the body.
6. Remove the detent slide spring and the detent slide rivet using tool #11026. Discard the detent slide and the inner frame.

Replacement

1. Position a new detent slide in the focus bar. On cameras to be returned to stock: Align the new inner frame (top) with the detent slide and replace the detent slide rivet. Cameras returned for repair are to be

handled as follows: Slide the focus bar to INFINITY. Tap the new inner frame (top) detent slide rivet hole with a # 2-56 tap. Apply Loc-Tite cement sparingly to a # 2-56 pan head shoulder screw # A11336 (available from Camera Repair, Waltham) and use the screw to secure the slide and inner frame (top).

2. Replace the RF/VF if it was removed.
3. Pivot the focus bar back into position in the body. Replace the two focus bar rivets and hardware using tool #169454. **BE SURE THE RF CAM IS NOT POSITIONED BEHIND THE FOCUS BAR BRACKET.**
4. Apply Loc-Tite cement sparingly to the detent stud and secure the inner frame (top) to the shutter shaft.
5. Position the detent on the detent stud so that the notched side is toward the lens. Hand press in place.
6. Insert a new spacer between the top inner frame and the U-frame and install the link pivot using tool #11220. Work the focus bar a few times to be sure that the linkage does not bind.
7. Perform the applicable RF/VF and lens checks described in Section III.

INNER FRAME (BOTTOM) REPLACEMENT

Removal

1. Extend the bellows to detent lock-in.

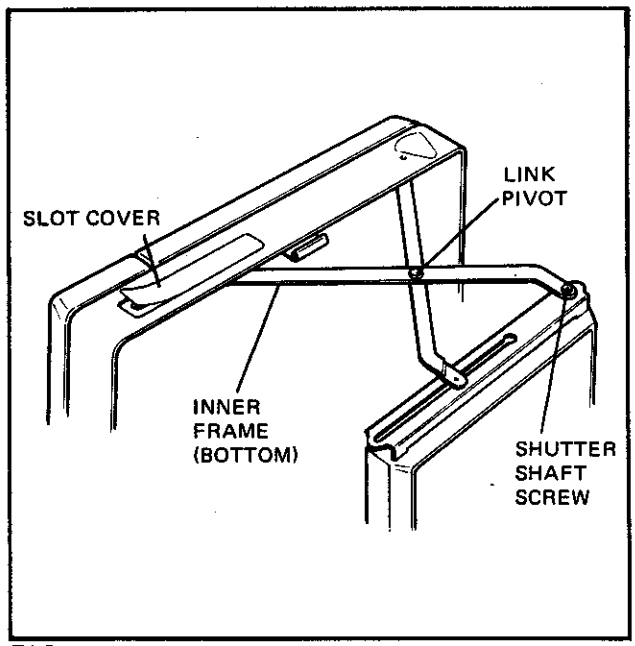


FIG. 5.22 REMOVING THE BOTTOM INNER FRAME

2. Remove the shutter shaft screw and two washers (if present) and move the inner frame out of the way. (See Figure 5-22.) **DO NOT REMOVE THE SHUTTER SHAFT.** (Replace the screw loosely so that the shaft cannot be dislodged.)
3. Unrivet the link pivot using tool #11026. Discard the spacer.
4. Move the focus bar to extreme CLOSE-UP.
5. Slide the inner frame (bottom) toward the left hand guard until it bottoms. Pivot the inner frame (bottom) toward the left hand guard until the track guide is free to slide out of the slot.

Replacement

1. Position the track guide of the new inner frame (bottom) in the slot. Pivot the inner frame (bottom) so that the track guide seats securely in the slot.
2. Insert a new spacer between the inner frame (bottom) and the U-frame and install the link pivot using tool #11220.
3. Remove the shutter shaft screw. Replace the two washers (if present) on the shutter shaft. Apply Loc-Tite sparingly to the shutter shaft screw and loosely fasten the inner frame (bottom) to the shutter shaft.
4. Position the camera on its back and check to see that the focus bar is set on extreme CLOSE-UP. Apply a slight downward pressure on the shutter assembly and tighten the shutter shaft screw. Work the focus bar a few times to be sure that the inner frame (bottom) does not bind.
5. Perform the applicable RF/VF and lens checks described in Section III.

U-FRAME ASSEMBLY REPLACEMENT

Removal

1. Extend the bellows to detent lock-in. Unrivet the link pivots holding the U-frame to the top and bottom inner frames using tool #11026. (Refer to Figures 5-21 and 5-22.) Discard the spacers.
2. Release the bottom of the U-frame from the shutter mount by removing the bushing from the keyhole in the slide. Unhook the spring from the bushing.

3. Remove the shutter release bushing from the camera. (Refer to procedure "Shutter Release Cable Replacement and Adjustment of Release Button.")
4. Slide the focus bar to extreme CLOSE-UP. Lift the U-frame up until it is freed from the pivot pin. Save the top and bottom spacers for reuse.

Replacement

1. Insert the bottom spacer on the pivot pin. Position the new U-frame on the pivot pin and then slide the U-frame under the right hand guard.
2. Install the shutter release bushing and cable in the camera.
3. Hook the spring onto the U-frame bushing and slide the bushing in the shutter mount keyhole.
4. Replace the top and bottom inner frame link pivots and new spacers using tool #11220. Work the focus bar back and forth a few times to be sure that the link pivots do not bind.
5. Perform the applicable RF/VF and lens checks described in Section III.

SHUTTER RELEASE CABLE REPLACEMENT AND ADJUSTMENT OF RELEASE BUTTON

Removal

1. Open the bellows to detent lock-in.
2. Loosen the cable release cover and free the shutter cable from the release cover.
3. Depress the Number 2 button on the camera and cut the tip from the end of the shutter release cable. Discard the Number 2 button and wire, but save the spring.
4. Insert a 1/16ths inch drive pin punch into the bushing and gently tap the punch (Figure 5-23). This should open the crimp in the bushing and allow the cable housing to fall out.
5. As shown in Figure 5-24, position special tool # 11410 against the bottom of the bushing and carefully tap the bushing out of the camera body. On metal body cameras, separate the bezel from the bushing and save it for reuse.

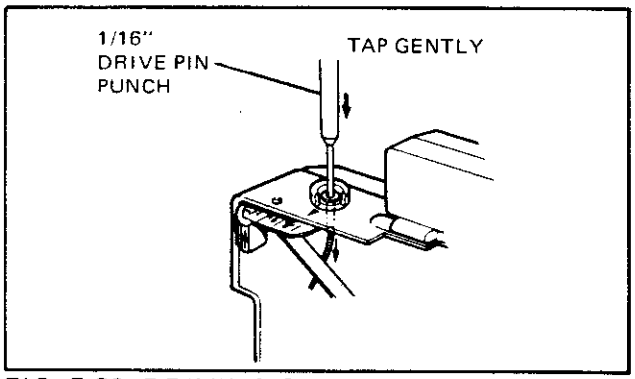


FIG. 5.23 DRIVING OUT THE CABLE HOUSING

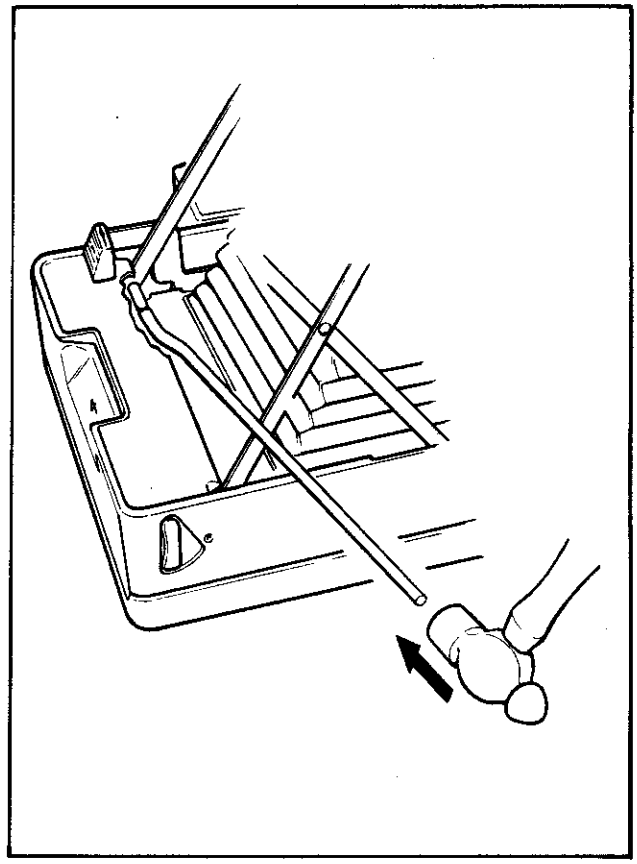


FIG. 5.24 DRIVING OUT THE BUSHING

Replacement

1. Replace the bushing as follows: On metal body cameras, position the bezel on the camera body. (If the bezel was damaged during removal, replace it.) Fit the new bushing and cable into the opening in the bezel. **Do not bend the cable.** Secure the bushing by tapping it with a 1/4 inch drive pin punch until the top of the bushing is flush with the bottom of the bezel.

   On plastic body cameras, draw the new bushing and cable through the opening in the bezel. Secure the bushing by tapping it with a 1/4 inch drive pin punch until the top of the bushing is flush with the camera body.
2. Insert the retained spring on the new shutter release knob wire and slide the wire through the bushing cable.

3. Depress the Number 2 button until the top of the button is flush with the top of the bezel. Insert the shutter release tip on the wire flush to the cable and crimp it using tool #169441 (Figure 5-25). Cut the excess wire.
4. Draw the shutter release cable through the bellows tab and insert the tip into the cable release block on the shutter housing. Retighten the top screw holding the cable release cover.
5. Perform procedure: "Checking the Shutter Release Button" in Section III.

Adjustment

If the shutter release button doesn't meet the requirements of the checkout procedure, make the following adjustment: Loosen the cable release cover and then adjust the height of the cable tip until the tripping action meets the requirements of the checkout. Retighten the cable release cover.

BATTERY INTERLOCK REPLACEMENT

Removal

1. Extend the bellows to detent lock-in and open the rear door. Remove the rivet securing the battery interlock to the body.
2. Open the battery compartment and unsolder the black lead from the battery interlock (except Model 360). Remove the battery interlock.

Model 360:

a. Remove the rear cover by carefully prying one of the hinge plugs free of the hinge using a jeweler's screwdriver. Then drive out the hinge pin and remaining hinge plug using a 1/16" drive pin punch.

b. Remove the Phillips-head and two slotted-head screws securing the converter board to the body.

c. Carefully lift the converter board out enough to expose the battery interlock. Unsolder the lead from the interlock and remove the interlock from the camera.

Replacement

1. Position the new battery interlock in the camera and solder the lead to the interlock. (Secure the converter board and replace the insulator paper and rear cover on Model 360.)
2. Secure the interlock to the body using a new rivet.
3. Perform the battery interlock checks described in Section III.

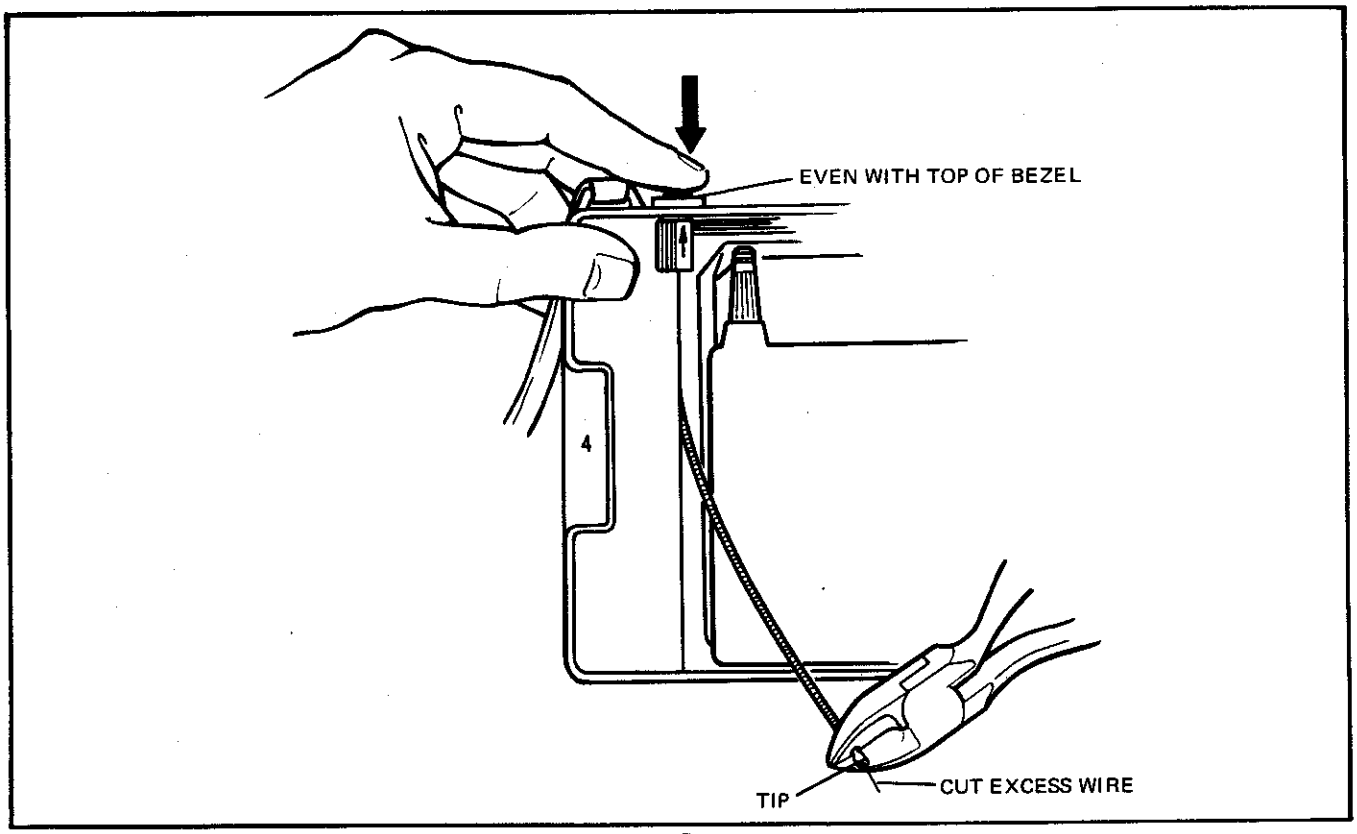


FIG. 5.25 CRIMPING THE SHUTTER RELEASE TIP

ADJUSTING THE BATTERY INTERLOCK SWITCH

1. Open the bellows to detent lock-in.
2. Use a narrow-bladed screwdriver to push down on the neck of the interlock switch (Figure 5-26). At the same time, force down the interlock from the other side of the camera body. This will bend the switch allowing it to make more positive contact.

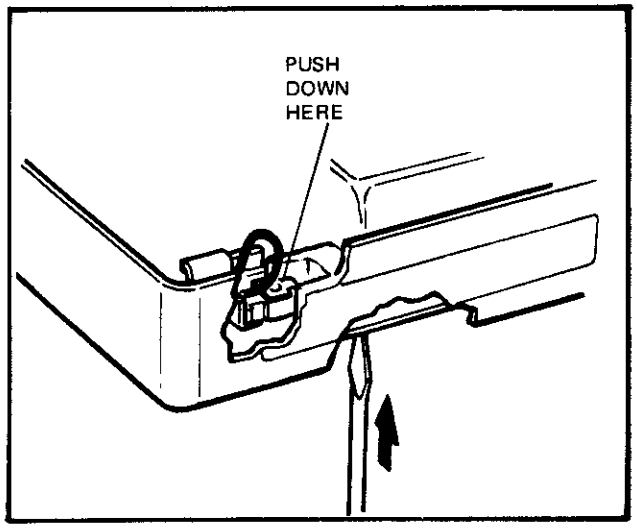


FIG. 5.26 ADJUSTING THE BATTERY INTERLOCK SWITCH

BATTERY CRADLE AND LEFT HAND GUARD REPLACEMENT

All Plastic Body Cameras Except Model 335:

Removal

1. Open the bellows to detent lock-in and move the focus bar to the extreme CLOSE-UP position.
2. Open the battery compartment and remove the battery.
3. Three screws are visible – one on each end of the left hand guard and one holding the door latch. Remove the screws.
4. Carefully guide the left hand guard out of the camera.

Replacement

1. Route the battery wires through the cutout at the lower end of the new left hand guard and fit the guard onto the camera.
2. Secure the guard with the three screws. (Be sure the latch is properly re-aligned.)
3. Replace the battery and close the compartment.

Model 335 Only:

Removal

1. Open the bellows to detent lock-in and move the focus bar to the extreme CLOSE-UP position.
2. Open the battery compartment and remove the two batteries.
3. Remove the two Phillips-head screws on the battery cradle.
4. Unsolder the black shutter lead at the common central terminal. Cut the black timer lead as close to the center terminal as possible (see Figure 5-27). Remove the battery cradle.

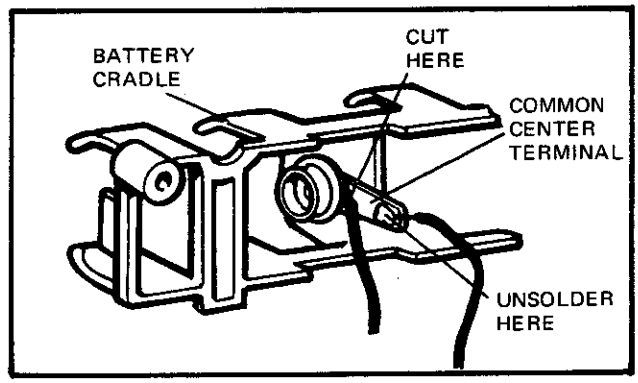


FIG. 5.27 FREEING THE BATTERY CRADLE

5. Remove the screw from the door latch and guide the left hand guard out of the camera.

Replacement

1. Route the battery wires through the cutout at the lower end of the left hand guard and fit the guard onto the camera.
2. Replace the door latch with the screw.
3. Remove the black lead which comes with the new battery cradle by cutting it all the way back to the terminal and then solder both the timer lead and the shutter lead to the common center terminal of the new cradle.
4. Position the battery cradle in the camera and secure it with the two Phillips-head screws.
5. Replace the batteries and close the compartment.

All Metal Body Cameras Except Model 350:

Removal

1. Open the bellows to detent lock-in and move the focus bar to the extreme CLOSE-UP position.

2. Open the battery compartment and remove the battery.
3. Remove the battery cradle by removing the Phillips-head screw.
4. Remove the latch and center retainer by removing the screw.
5. Remove the left hand guard by carefully tapping the posts free of the fasteners using a 1/8" drive pin punch as shown in Figure 5-28.

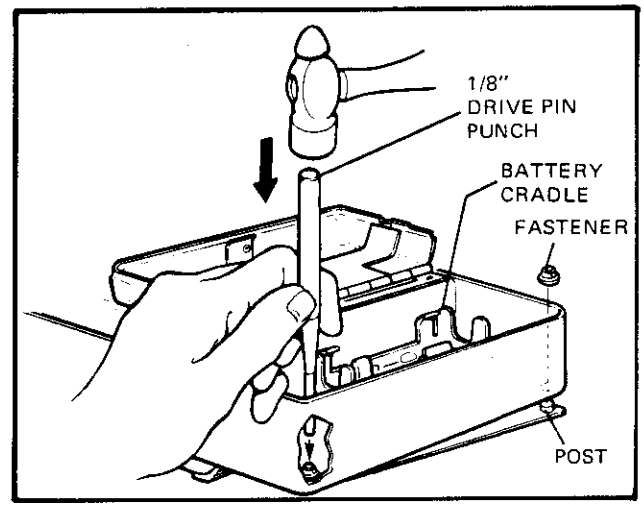


FIG. 5.28 REMOVING THE LEFT HAND GUARD

Replacement

1. Route the battery wires through the cutout at the lower end of the new left hand guard and fit the guard onto the camera.
2. Secure the guard with the fasteners using tool #CR11008 (Figure 5-29).
3. Replace the center retainer and latch using the shorter Phillips-head screw.
4. Replace the battery cradle using the longer Phillips-head screw.
5. Replace the batteries and close the battery compartment.

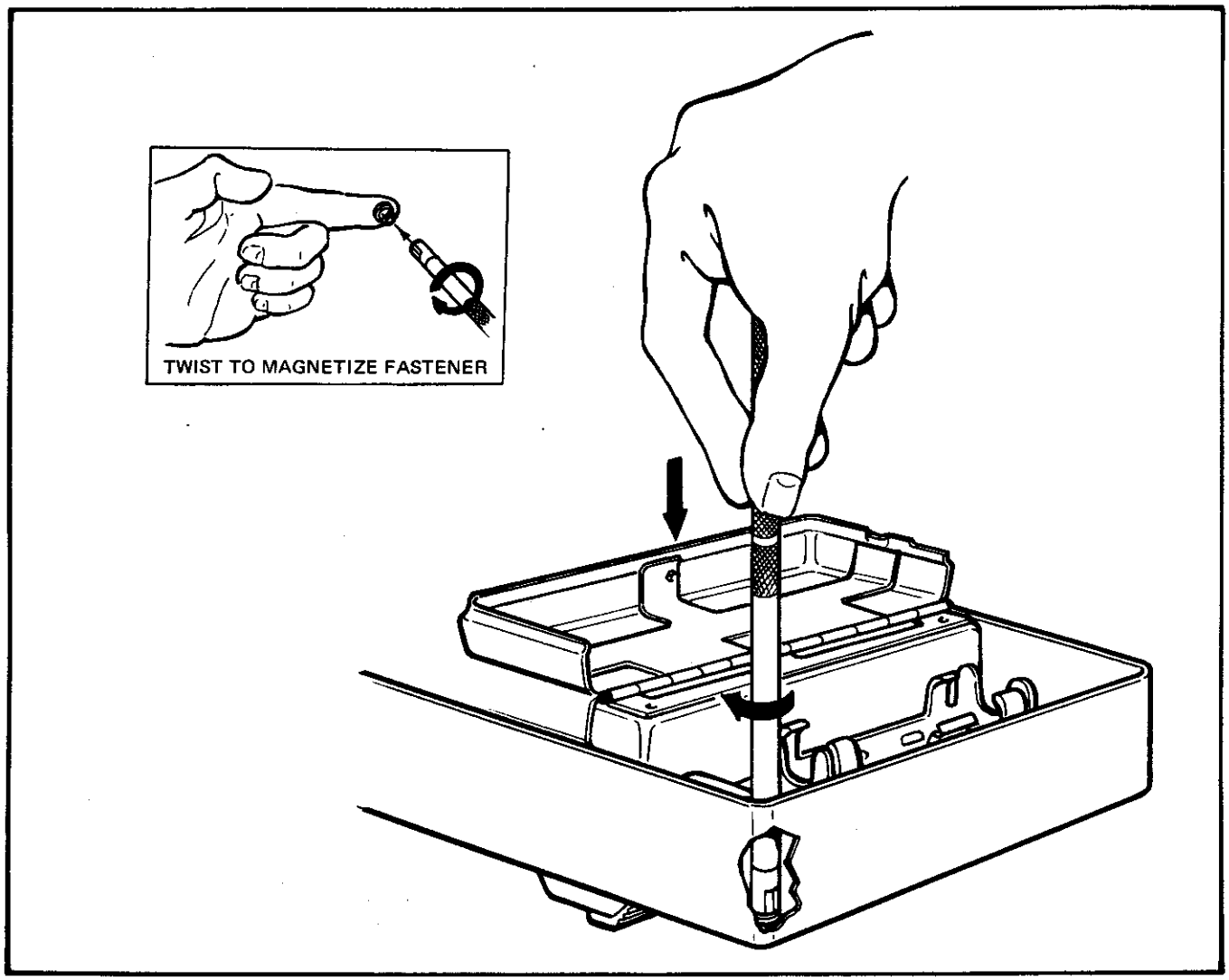


FIG. 5.29 INSTALLING THE LEFT HAND GUARD

Model 350 Only:

Removal

1. Open the bellows to detent lock-in and move the focus bar to the extreme CLOSE-UP position.
2. Open the battery compartment and remove the two batteries.
3. Remove the two screws holding the battery cradle and lift the cradle up. Cut the two black leads as close to the common center terminal as possible. Remove the battery cradle.
4. Remove the latch and center retainer by removing the screw holding them to the left hand guard.
5. Remove the left hand guard by carefully tapping its posts free of the fasteners using a 1/8 inch drive pin punch (Figure 5-28).

Replacement

1. Route the battery wires through the cutout at the lower end of the new left hand guard and fit the guard onto the camera.
2. Secure the guard with fasteners using tool #CR1008 as shown in Figure 5-29.
3. Replace the center retainer and latch using the Phillips-head screw.
4. Solder the two black leads to the common center terminal of the cradle.
5. Replace the batteries and close the compartment.

BATTERY TERMINAL REPLACEMENT

If battery terminals have to be replaced, follow the illustrations in Figure 5-30. Choose the illustration applicable to the camera.

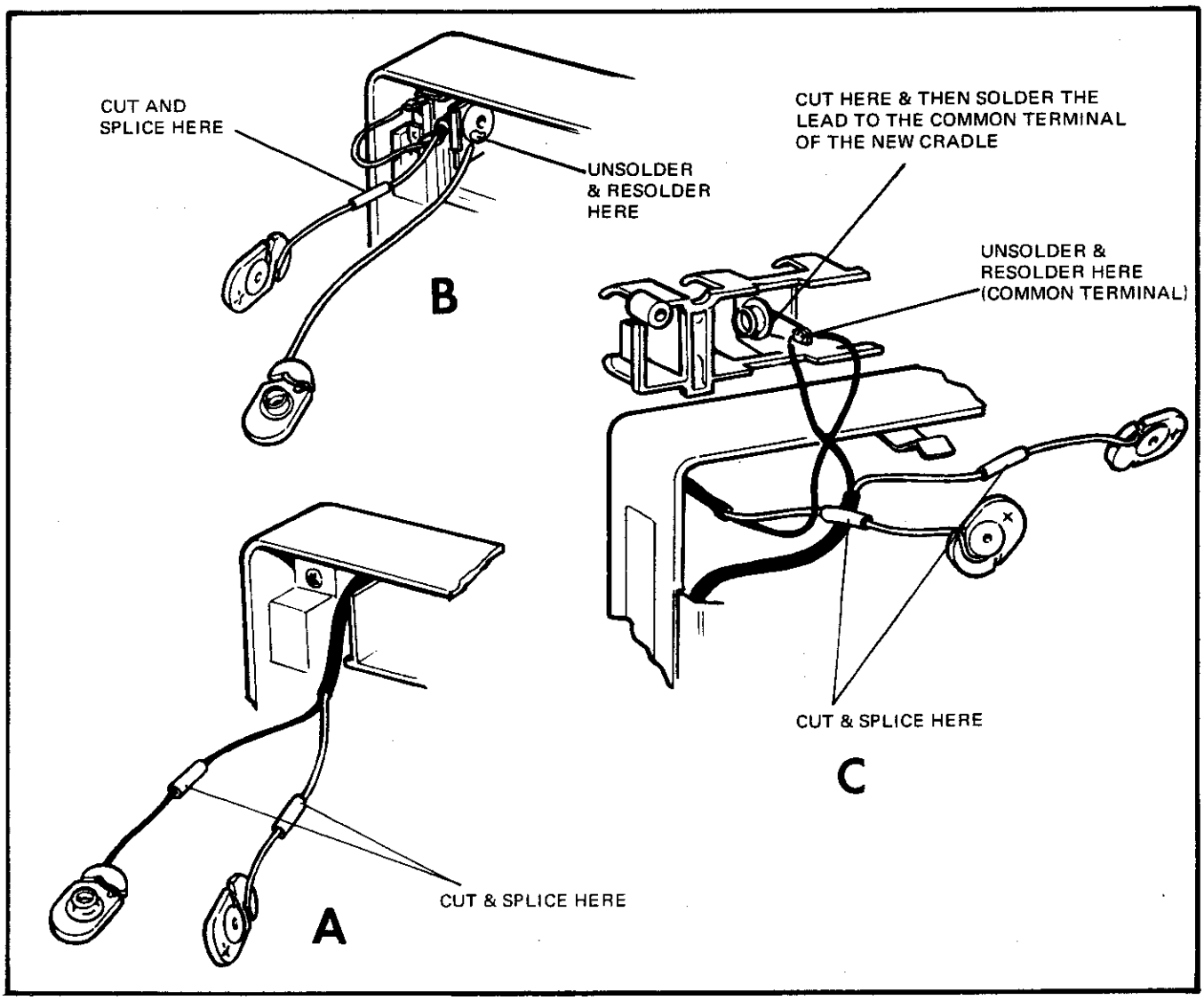

CUT AND SPLICE HERE
UNSOLDER & RESOLDER HERE
B
CUT HERE & THEN SOLDER THE LEAD TO THE COMMON TERMINAL OF THE NEW CRADLE
UNSOLDER & RESOLDER HERE (COMMON TERMINAL)
CUT & SPLICE HERE
C
CUT & SPLICE HERE
A

FIG. 5.30 REPLACING BATTERY TERMINAL

1. The easiest replacement is shown in A. Simply cut one lead back about 1 1/2 inch from the terminal and the second about 1 inch from the terminal. Strip back the insulation on the battery cable leads and slide a piece of heat shrink tubing over the wire. Splice the lead of a new terminal (cut to length) to the battery cable lead and then slide the heat shrink tubing over the splice. Heat the tubing to fit.
2. For cameras with interlocks, see illustration B. Follow the instructions given above for the terminal which comes directly out of the battery cable. For the other terminal, unsolder the lead from its contact. Resolder the new terminal in position as shown.
3. Illustration C is applicable for Models 335 and 350. For the terminals which branch out of the battery cable and timer cable, follow the instructions in 1 above. If the common center terminals on the battery cradle are corroded, cut and unsolder as shown in C. Resolder both leads to the common terminal at the point shown in the illustration.

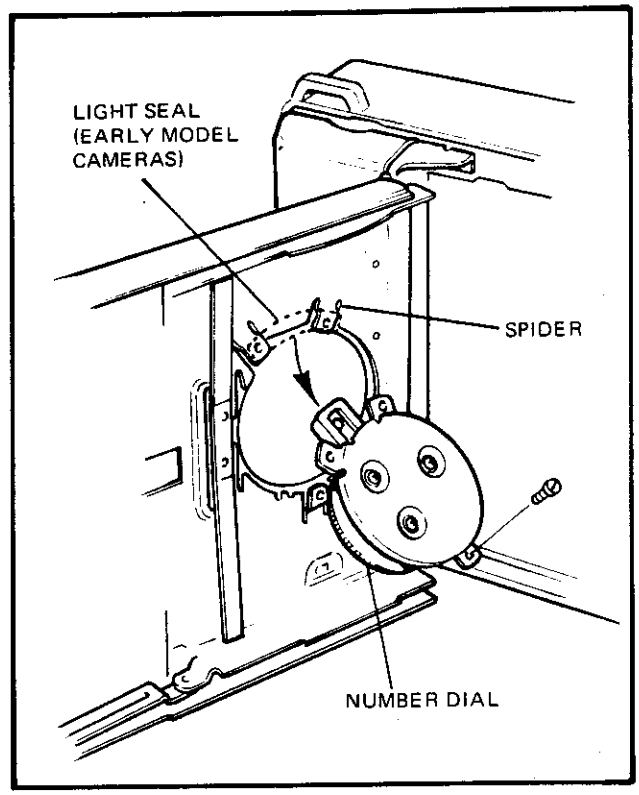


FIG. 5.31 REMOVING THE MECHANICAL TIMER

MECHANICAL TIMER REPLACEMENT

Removal

Open the rear door and remove the three screws holding the timer to the spider. (Early model cameras have a light seal which should also be removed.) Remove the timer and number dial from the rear door (Figure 5-31).

Replacement

1. Position the number dial on the new timer and install the assembly in the rear door as shown in Figure 5-32.
2. Secure the timer to the spider with one screw so that the start lever is positioned straight-up and the arrow is positioned as

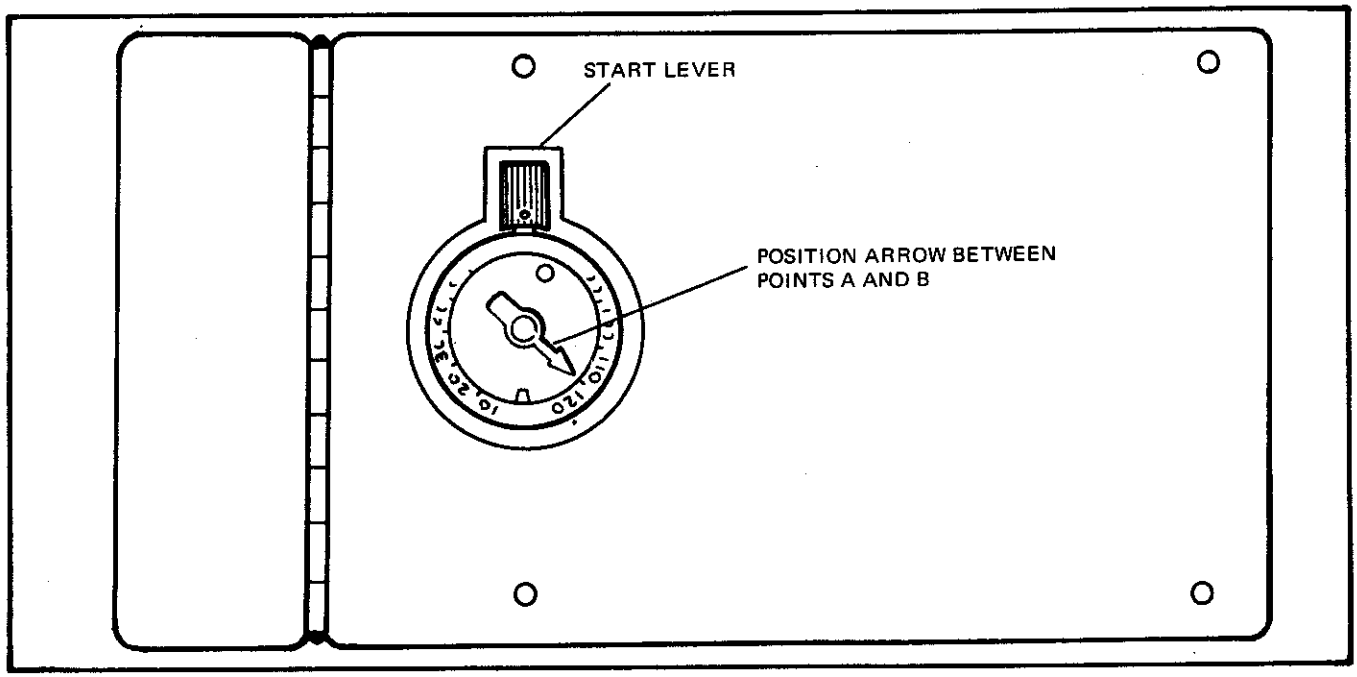


FIG. 5.32 INSTALLING THE TIMER

shown in Figure 5-32. Replace the remaining two screws (and light seal if one was removed).

3. Operate the timer and check its action.

REPLACING THE ELECTRONIC TIMER

Removal

1. Open the rear door and force out the index plate from the knob using a 1/16" drive pin punch (Figure 5-33).
2. Remove the potentiometer driving knob from the timer using an X-acto knife with #11 blade (Figure 5-34). Remove only enough heat seal to allow the knob to clear the potentiometer.

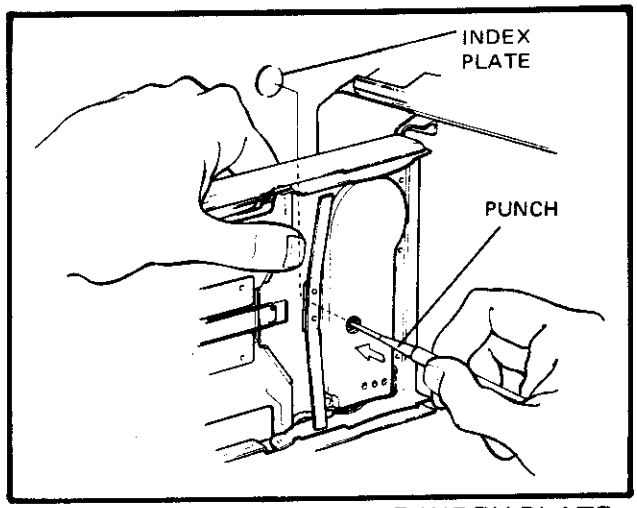


FIG. 5.33 FORCING OUT THE INDEX PLATE

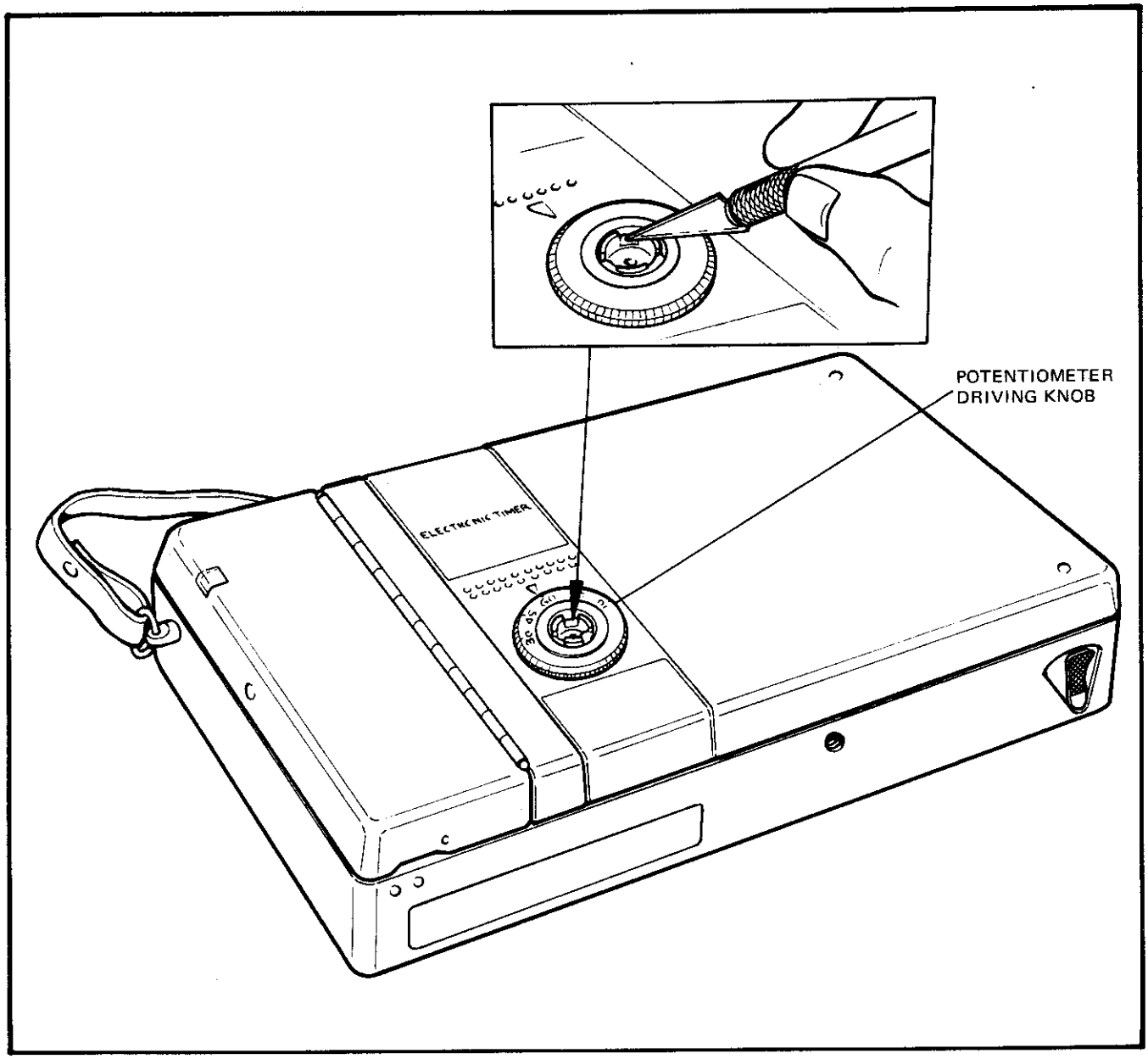


FIG. 5.34 REMOVING THE DRIVING KNOB

3. Remove the electrical nameplate: Carefully pry one edge of the nameplate loose using a fine blade screwdriver. Peel the nameplate free of the rear door using pliers (Figure 5-35).

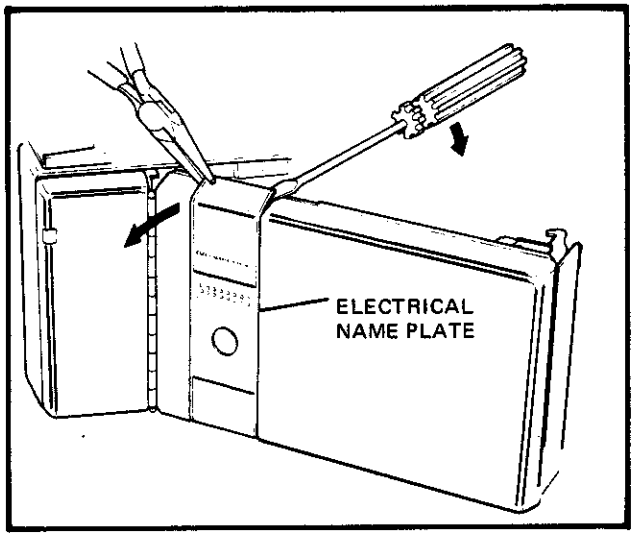


FIG. 5.35 FREEING THE ELECTRICAL NAMEPLATE

4. Open the rear door and unsolder the black and white leads (identified in Figure 5-36) from the timer.

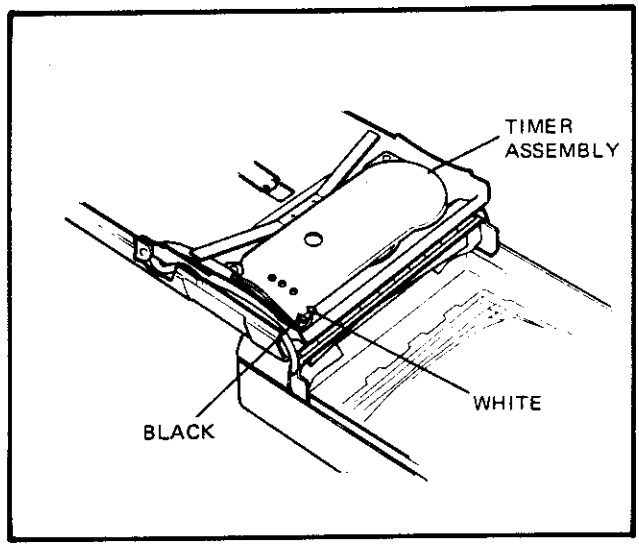


FIG. 5.36 LOCATION OF TIMER LEADS

5. Remove the rear door from the rear door spider: Remove the two rear door rivets and the two timer assembly rivets using a De-StaCo tool with anvil B11357-part 1 and head B11357-part 2. Do not lose the red roll latch or the spring on the timer.

6. Remove the insulator and then unsolder the three black leads from timer switch (Figure 5-37). Remove the timer assembly.

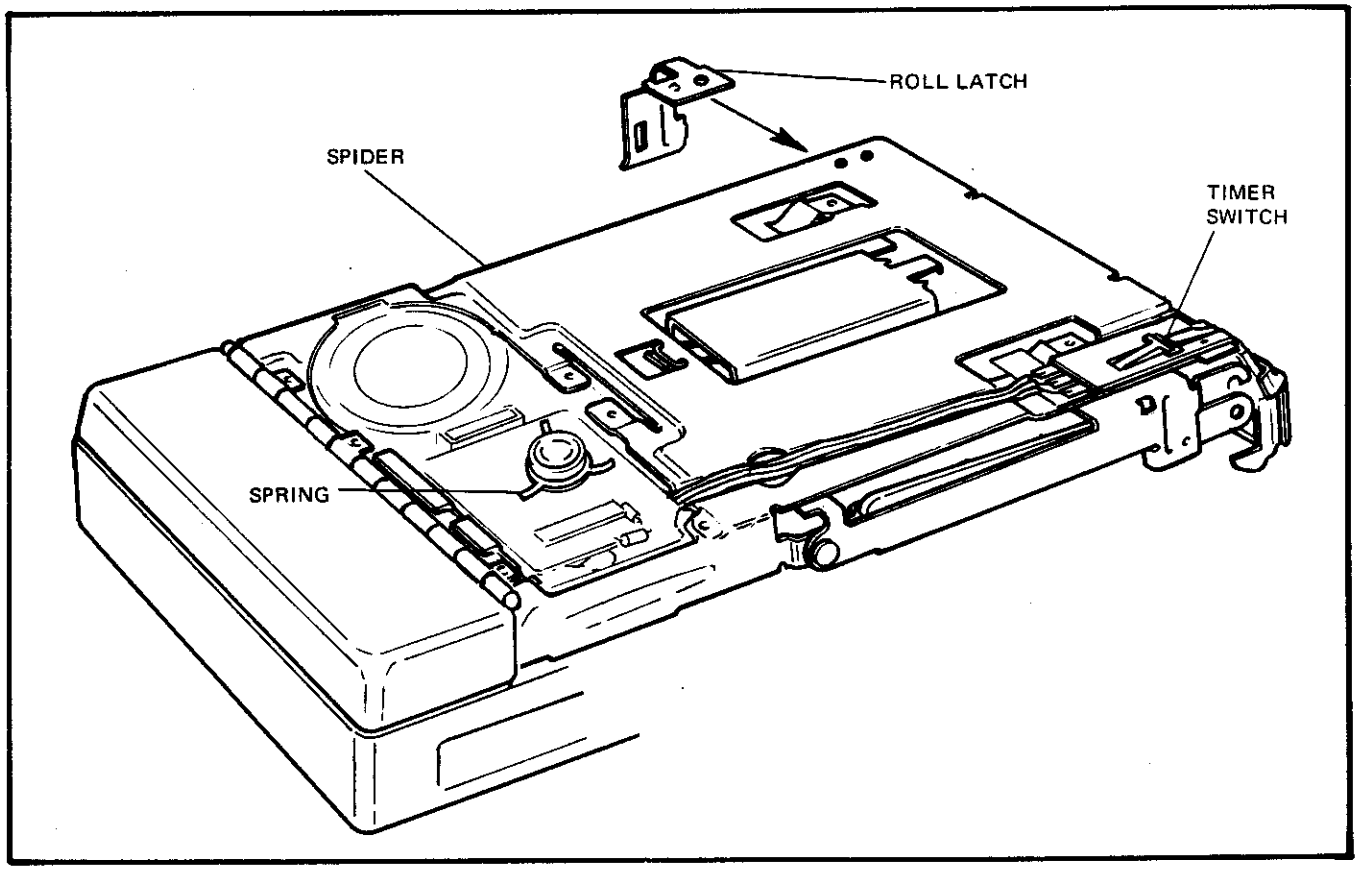


FIG. 5.37 UNSOLDERING THE SWITCH LEADS

Replacement

1. Position the new timer assembly in the rear door spider. Place the spring over the timer. Run the timer cable to the switch and solder the three leads to the timer switch. Replace the insulator and position the switch in the spider.
2. Position the red roll latch in place and then secure the rear door to the spider using the four rivets. Install the rivets with a De-StaCo tool with anvil B11357-part 3 and head B11357-part 4.
3. Solder the black and white leads to the timer (see Figure 5-36).
4. Activate the cement on the electrical nameplate using M.E.K. (methyl-ethyl-ketone) and secure the nameplate in place on the rear door.
5. Adhere the driving knob to the timer potentiometer using silicone rubber cement. Be sure the tang on the knob fits in the slot on the potentiometer (Figure 5-38).
6. Activate the cement on the index plate using M.E.K. and secure the plate in place on the potentiometer driving knob.

ELECTRONIC TIMER SWITCH CONTINUITY CHECK AND ADJUSTMENT

1. Disassemble the electronic timer from the rear door. (Do not unsolder the black and white leads from the timer. Refer to procedure: "Replacing the Electronic Timer.")
2. Check the timer switch continuity:

a. Set a VOM on the Rxl scale and place probes on the contacts shown in Figure 5-39. The reading should be INFINITY. If the meter shows a continuity reading, check for bridging of the solder connections between the switch contacts. If there is no bridging and the reading is continuity, replace the timer.

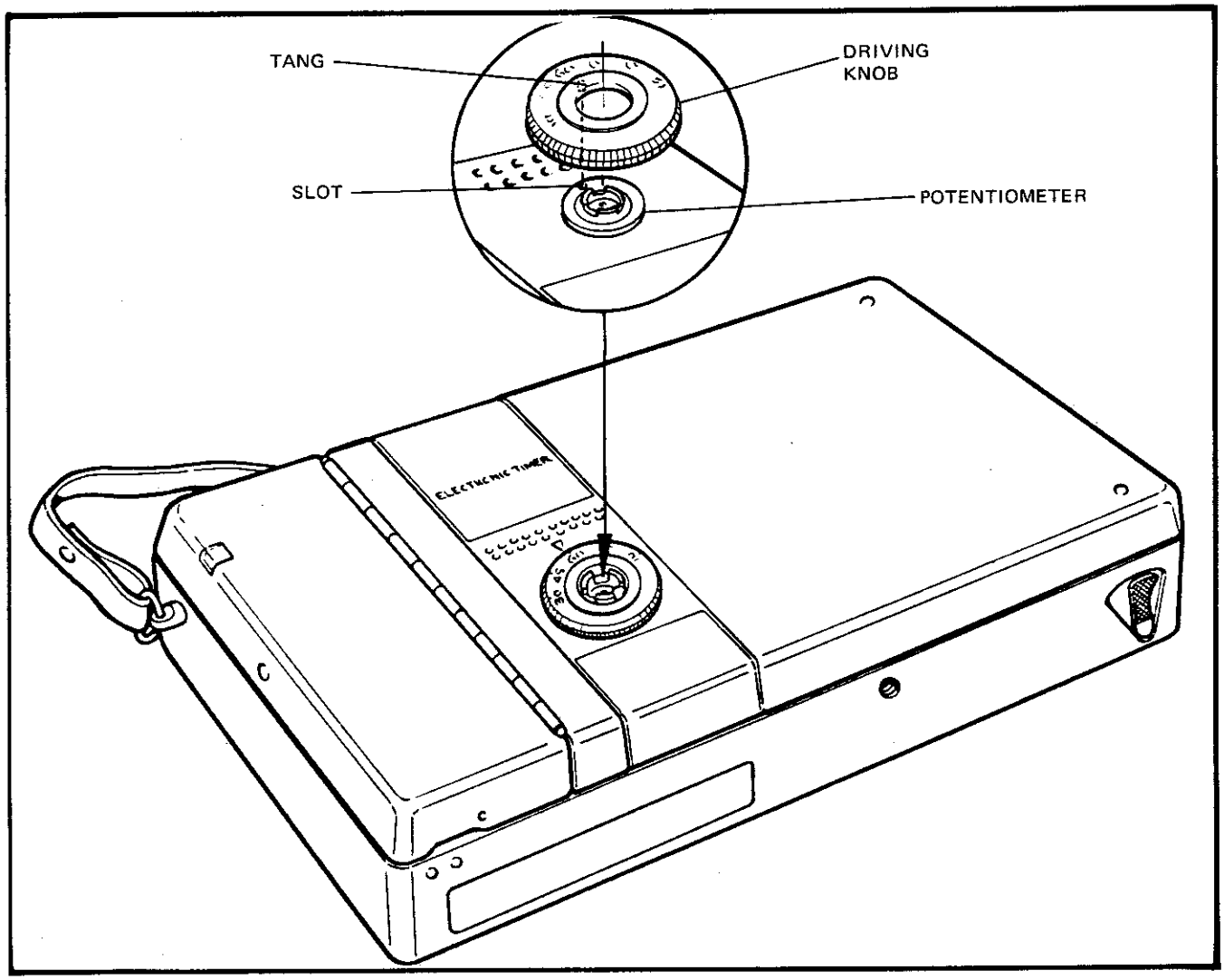


FIG. 5.38 INSTALLING THE NEW KNOB

b. If the reading in 2a is INFINITY, depress the switch tab (Figure 5-40). The reading should be ZERO. If it is not, check the "T" contact to be sure that both arms are touching the contacts. If either arm is not touching, tweak that arm until it does touch the contact. If the arms are touching the contact and the reading is still INFINITY, spray the arms and contacts with "Hush" (red can) contact cleaner and recheck the reading. If the reading is still not correct, replace the timer.

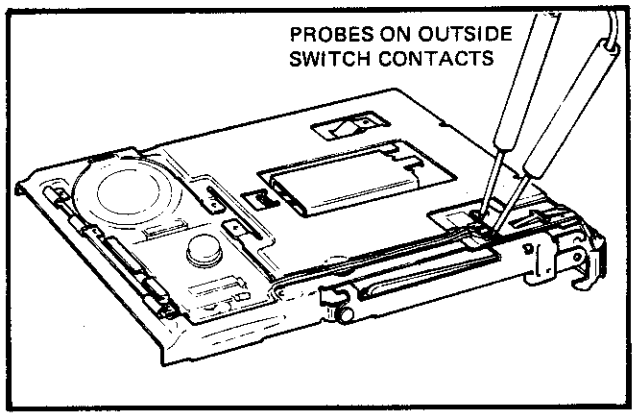


FIG. 5.39 CHECKING THE TIMER SWITCH

ELECTRONIC TIMER SWITCH REPLACEMENT

Removal

1. Disassemble the rear door from the spider according to the procedure: "Replacing the Electronic Timer".
2. Lift the switch from the spider and remove the insulator. (Refer to Figure 5-40.)
3. Unsolder the three leads from the timer switch contacts.

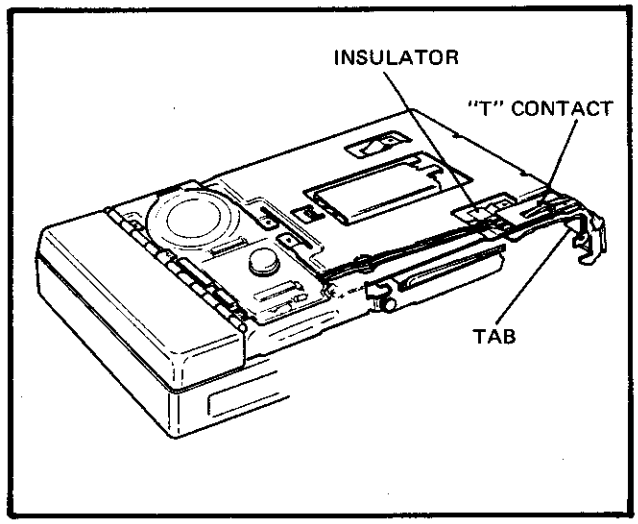


FIG. 5.40 CHECKING THE SWITCH UNDER LOAD

Replacement

1. Solder the three leads to the switch contacts.
2. Position the insulator on the switch and place the switch into the spider.
3. Assemble the rear door to the spider (refer to "Replacing the Electronic Timer").

REPLACEMENT OF IMAGE SIZERS

Removal

1. Extend the bellows to detent lock-in and open the rear door of the camera.
2. Remove the Phillips-head screw holding the image sizer to the camera.
3. Lift the image sizer off the camera, noting how the cam fits into the focus bar.

Replacement

1. Position the new image sizer over the posts on the camera body. Be certain that the cam on the image sizer fits into the hole in the focus bar.
2. Secure the image sizer on the camera using the Phillips-head screw.
3. Check the image sizer as instructed in Section III.

REPLACEMENT OF NON-FOLDING RANGEFINDER/VIEWFINDERS

Removal

1. Extend the camera bellows to detent lock-in and open the rear door.
2. Remove the Phillips-head screw holding the RF/VF to the camera body.
3. Close the bellows and identify the holding hardware which secures the front of the

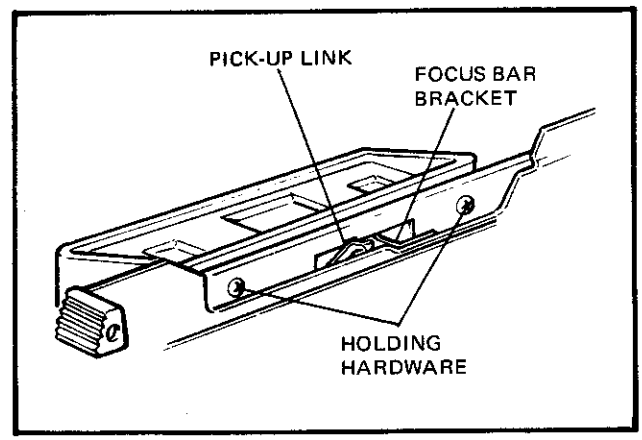


FIG. 5.41 POSITIONING THE RF/VF ON THE CAMERA

RF/VF to the camera (Figure 5-41). Depending on whether there are hex-head screws or Phillips-head screws, use tool #A11092 or #A11093 to remove them. Retain the hardware. Lift the RF/VF off the camera.

Replacement

1. Position the RF/VF on the camera. **Be sure the focus bar bracket is to the left of the RF/VF pick-up link as shown in Figure 5-41.**
2. Using tool #A11092 or #A11093 replace the holding hardware at the front of the camera.
3. Extend the bellows to detent lock-in and replace the Phillips-head screw holding the RF/VF.
4. Perform the applicable RF/VF checks described in Section III.

REPLACEMENT OF FOLDING RANGEFINDER/VIEWFINDERS

Removal

Using special tool #169451 as shown in Figure 5-42, remove the left hinge pin. Retain the pin and the spring. Lift the RF/VF free of the camera.

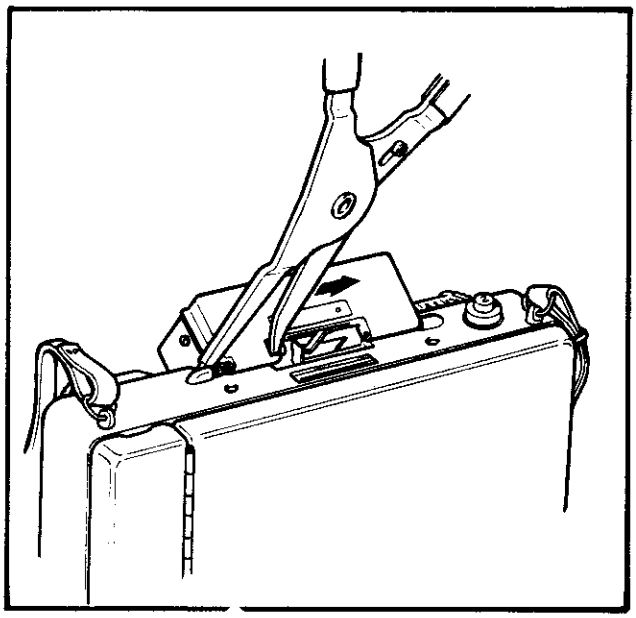


FIG. 5.42 FREEING THE RF/VF

Replacement

Set the focus bar to INFINITY. Next, position the new RF/VF on the camera and place the spring in position between the left hinge pin and the pivot pad. **(Be sure the focus bar bracket is to the left of the RF/VF pick-up link as shown in Figure 5-43.)** Use special tool #169451 (as shown in Figure 5-43) to drive the left hinge pin into position. Swivel the RF/VF into the raised position and listen for binds. Perform the applicable RF/VF checks described in Section III.

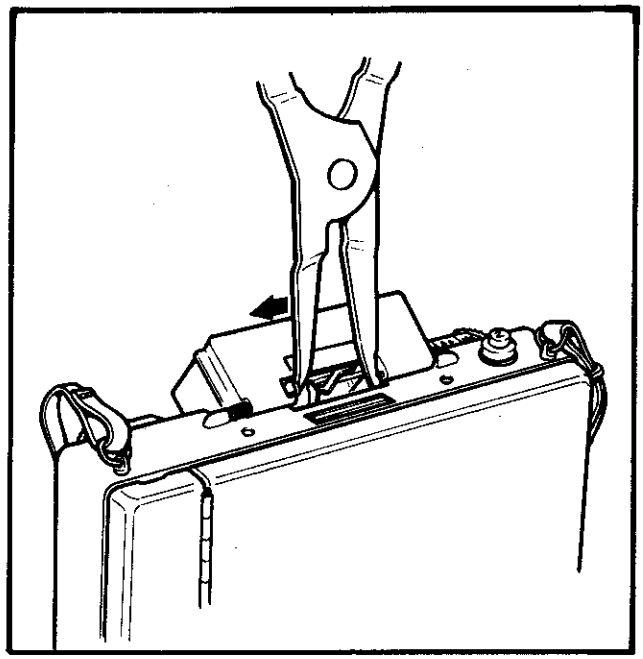


FIG. 5.43 INSTALLING A FOLDING RF/VF

REPLACEMENT OF POLAROID RF/VF OPTICS ASSEMBLY & VF WINDOW

Removal

1. Remove the rear window plate from the RF/VF by removing the two retaining screws.
2. Unhook the spring (Figure 5-44) from the optics assembly tab. Allow the spring to slide under the tab.

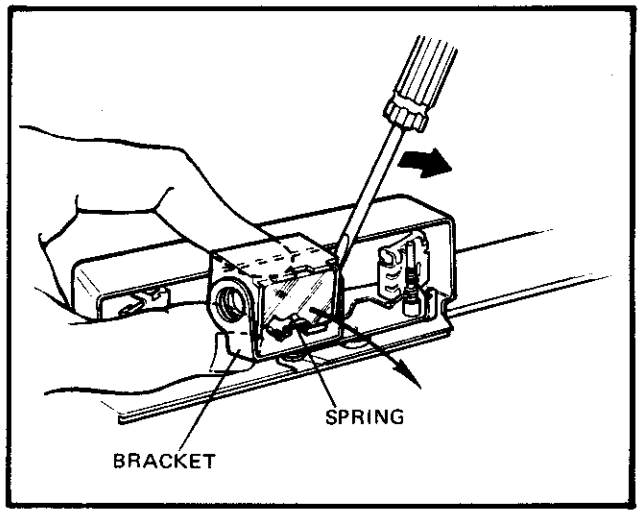


FIG. 5.44 REMOVING THE OPTICS ASSEMBLY

3. Carefully spread the mounting brackets apart. Spread them just enough to disengage the optics assembly. Lift out the assembly.
4. Examine the viewfinder window. If it is scratched or broken, replace it. First remove and then clean out all glass with a low pressure air hose. Spread Dupont Duco cement (or equivalent) sparingly around the window frame and gently press the window into place. **Immediately wipe away any excess cement and thoroughly clean the window before installing the new optics assembly.**

Replacement

1. Squeeze the mounting brackets together until they are about the same distance apart as they were before the optics assembly was removed.
2. Snap the optics assembly into position between the mounting brackets. Be sure the adjusting screw is facing the back of the camera.
3. Hook the spring back in place on the optics assembly tab.
4. Replace the rear window plate and secure it with the two retaining screws.
5. Perform the applicable RF/VF checks described in Section III.

REPLACEMENT OF FOLDING RF/VF MAGNETS

Removal

1. Extend the camera bellows to detent lock-in and set the focus bar to extreme CLOSE-UP. Open the rear door and raise the RF VF.
2. Using a 1/16th inch drive pin punch, tap out the magnet pivot as shown in Figure 5-45.
3. Remove the magnet, pole pieces, and spring.
4. Be sure that no frayed parts of the pivot remain in the hole. If some pieces remain, clean them out using a Dremel Manufacturing Company grinder (or equivalent).

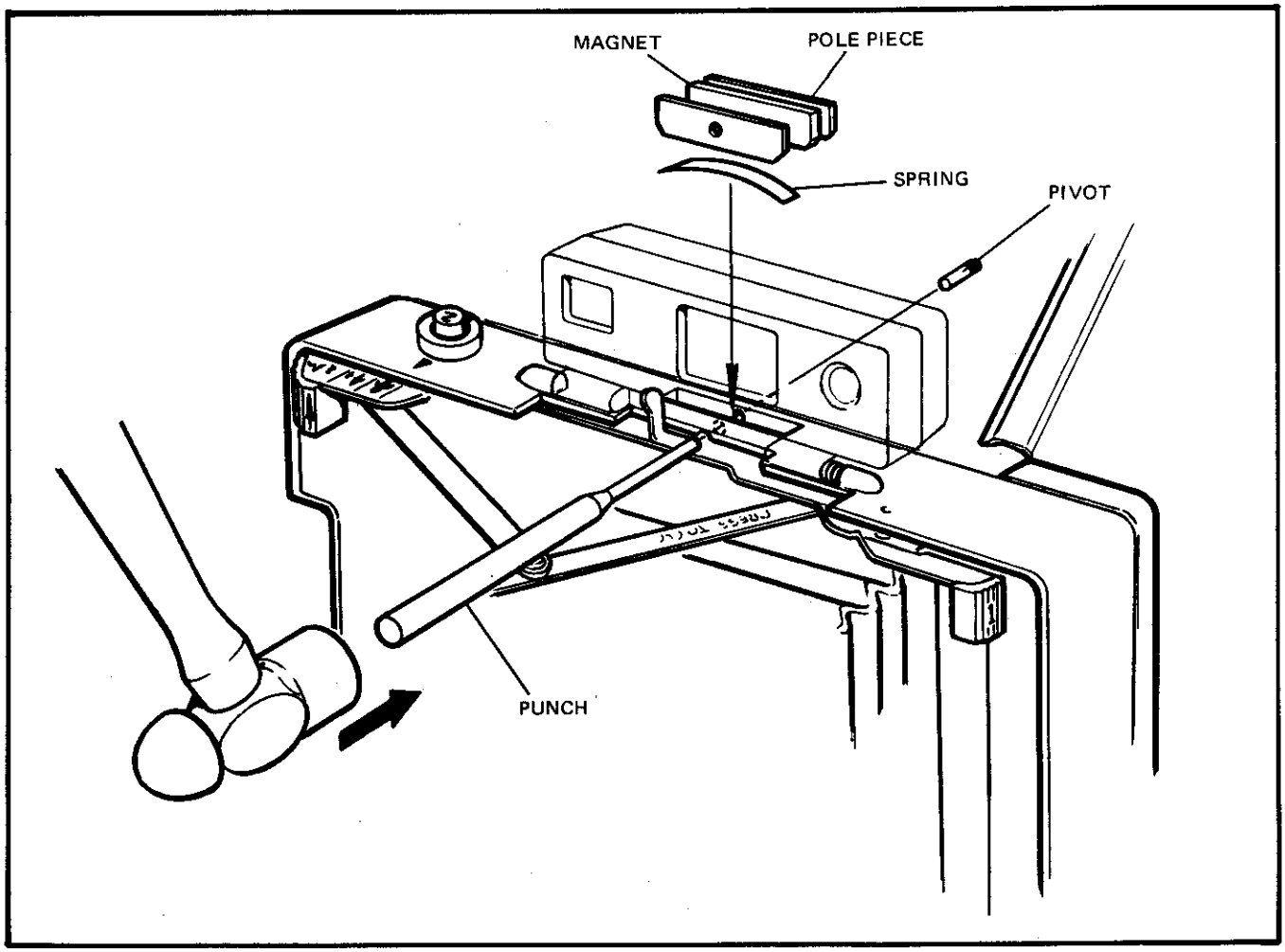


FIG. 5.45 DRIVING OUT THE MAGNET PIVOT

Replacement

1. Install the spring, pole pieces, and magnet into the camera body and secure them by tapping the pivot back into place.
2. Perform the applicable RF/VF checks described in Section III.

REPLACEMENT OF FOLDING RF/VF PIVOT PADS (METAL BODY CAMERAS ONLY)

Removal

1. Remove the RF/VF according to previous instructions.
2. If the pivot pad (the pads hold the RF/VF hinge pins) to be replaced is still on the camera, carefully remove it without damaging the camera body.
3. Drive out the pivot pad posts if they break off in the camera body.

Replacement

1. Roughen the pivot pad holes in the camera body (and the area around the holes which will be covered by the new pad) using a Dremel Manufacturing Company hand grinder (or equivalent).
2. To prevent the new pad from interfering with the focus bar, cut approximately 1/16th of an inch off the posts on the new pad. Roughen the posts using a file.
3. Secure the new pivot pad on the camera body using Tra-Con aluminum-colored epoxy which is available from Polaroid Camera Product Services, Waltham, Mass. Mix the epoxy according to package directions and apply it sparingly to both the pivot pad holes and the area around the holes. Position the new pivot pad on the camera and firmly press it down into place. **Wipe off any excess epoxy immediately.**
4. Allow the epoxy to dry for a minimum of three hours.
5. Replace the RF/VF according to previous instructions and perform the applicable RF/VF checks described in Section III.

RANGEFINDER/VIEWFINDER AND IMAGE SIZER ADJUSTMENTS

1. Range/Topside Adjustments for Zeiss Ikon RF/VF

NOTE: These adjustments should be made only after the lens has been collimated.

a. Remove the two cover retaining screws and lift the cover off the RF/VF assembly. Remove the two plate retaining screws and the cover plate.

b. Clamp the camera onto the collimator, move the focus bar to INFINITY and aim at the infinity tube. Observe the infinity target through the RF/VF eye lens.

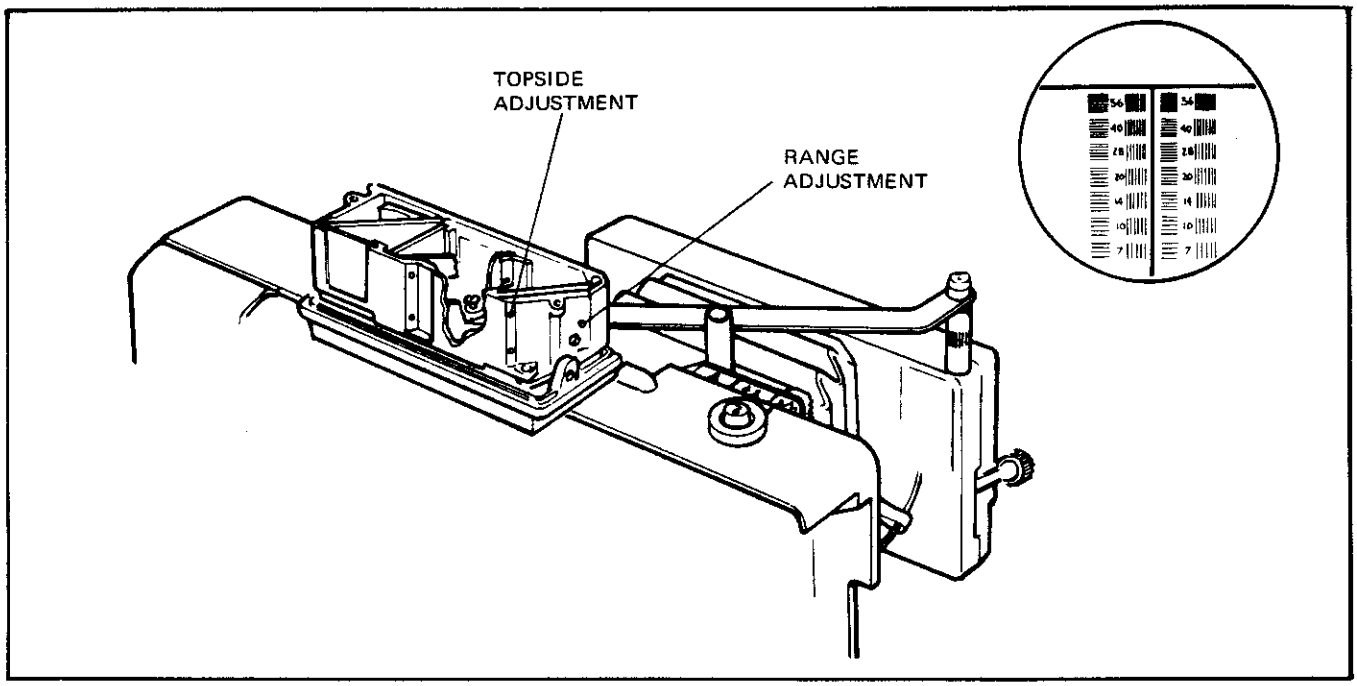


FIG. 5.46 RANGE/TOPSIDE ADJUSTMENTS FOR ZEISS IKON RF/VF

IF THE VERTICAL LINES DO NOT MERGE: Using an appropriate tool, adjust the range screw (Figure 5-46) until the vertical lines in the target meet.

IF THE HORIZONTAL LINES DO NOT MERGE: Using an appropriate tool, adjust the topside screw (Figure 5-46) until the horizontal lines in the target meet.

c. Swing the camera around to the four-foot target. While looking through the focal plane plate loupe, move the focus bar toward CLOSE-UP. Stop focusing when the image is sharpest. Now, look at the larger crosshair target through the RF/VF eye window:

IF THE IMAGES OF THE VERTICAL LINE ARE NOT MERGED: Using an appropriate tool, adjust the range screw (Figure 5-46) until the images of the vertical line merge.

IF THE IMAGES OF THE HORIZONTAL LINE ARE NOT MERGED: Using an appropriate tool, adjust the topside screw (Figure 5-46) until the images of the horizontal line merge.

d. Go back to the infinity target and repeat the infinity check (step b).

e. When all adjustments are complete, seal the adjusting screws with shellac.

NOTE: If you have difficulty making a good topside adjustment, check the RF/VF magnet. On some cameras the magnet pivot (Figure 5-45) has a slotted head which can be turned, changing the position of the magnet. Doing this may help in bringing in topside.

f. Take the camera off the collimator and replace the cover plate and the cover on the RF/VF using their retaining screws.

2. Range/Topside Adjustments for Polaroid RF/VF

NOTE: These adjustments should be made only after the lens has been collimated.

a. Remove the two window plate screws and lift the rear window plate off the RF/VF assembly.

b. Clamp the camera onto the collimator, move the focus bar to INFINITY and aim at the infinity tube. Observe the infinity target through the RF eye lens.

IF THE VERTICAL LINES DO NOT MERGE: Using special tool #169443, adjust the range screw (Figure 5-47) until the vertical lines in the target meet.

IF THE HORIZONTAL LINES DO NOT MERGE: Using special tool #169443, adjust

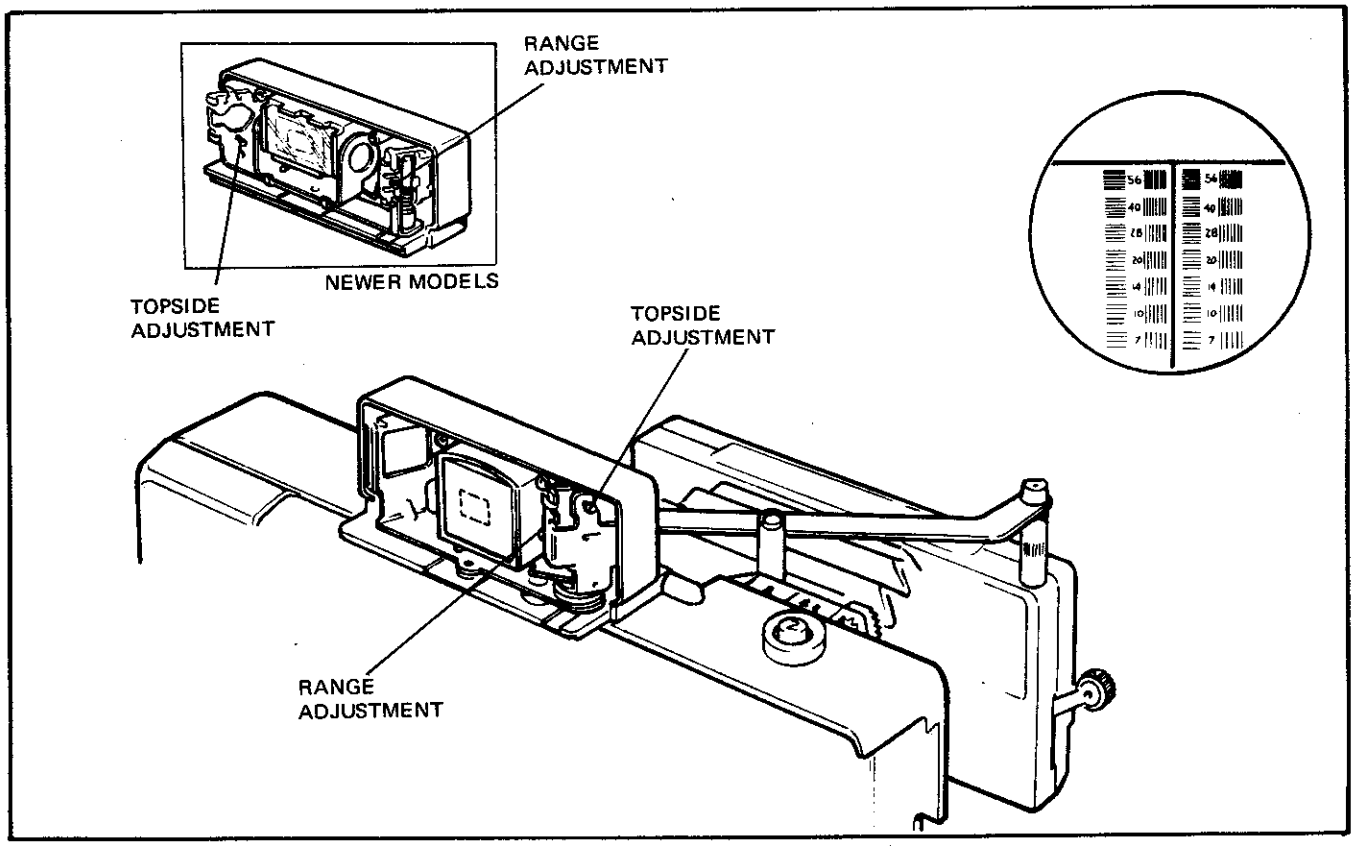


FIG. 5.47 RANGE/TOPSIDE ADJUSTMENTS FOR POLAROID RF/VF

the topside screw (Figure 5-47) until the horizontal lines in the target meet.

c. Swing the camera around to the four-foot target. While looking through the focal plane plate loupe, move the focus bar toward CLOSE-UP. Stop focusing when the image is sharpest. Now, look at the larger crosshair target through the RF/VF eye window:

IF THE IMAGES OF THE VERTICAL LINE ARE NOT MERGED: Using special tool #169443, adjust the range screw (Figure 5-47) until the images of the vertical line merge.

IF THE IMAGES OF THE HORIZONTAL LINE ARE NOT MERGED: Using special tool #169443, adjust the topside screw (Figure 5-47) until the images of the horizontal line merge.

d. Go back to the infinity target and repeat the infinity check (step b).

e. When all adjustments are complete, seal the adjusting screws with shellac.

f. Take the camera off the collimator and replace the rear window plate.

3. **Range Adjustment for Image Sizer**

IF THE MOVABLE AND FIXED LINES DID NOT MEET: As shown in Figure 5-48 there is a very small slot above the lens. This provides access to an adjusting spring which controls the alignment of the lines. Set the focus bar to INFINITY. Using a very fine pointed tool such as a fine bladed tweezer, move the adjusting spring while looking through the eye lens. Stop adjusting

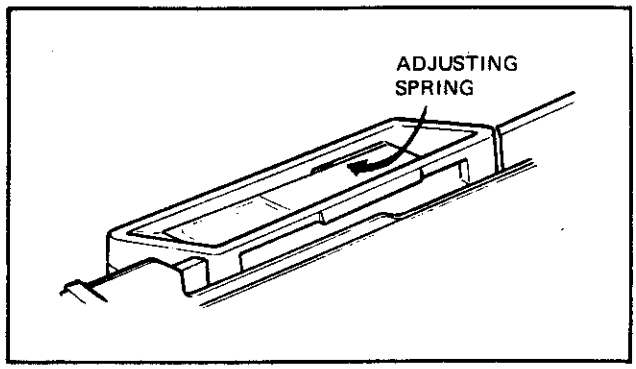


FIG. 5.48 RANGE ADJUSTMENT FOR IMAGE SIZER

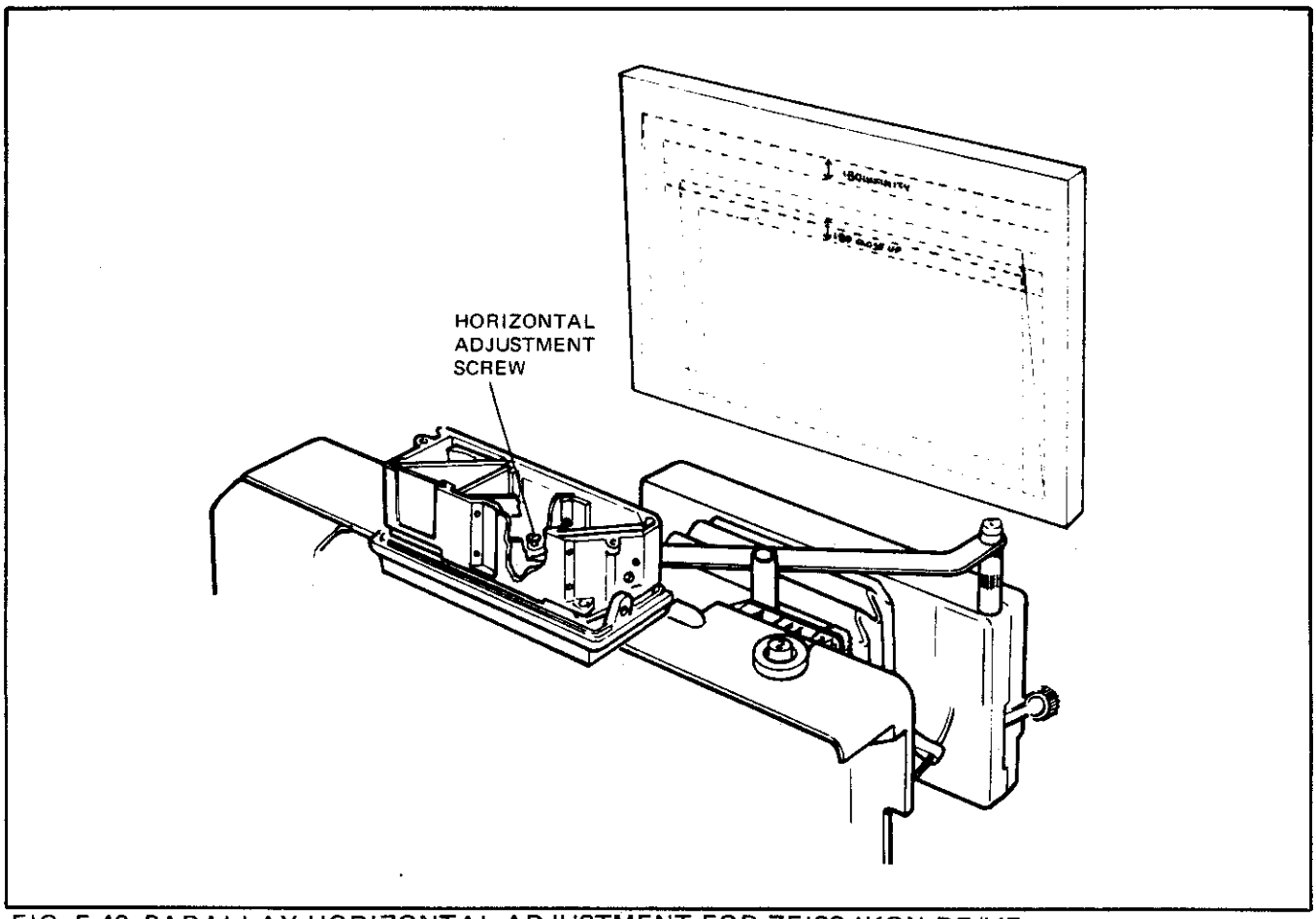


FIG. 5.49 PARALLAX HORIZONTAL ADJUSTMENT FOR ZEISS IKON RF/VF

the spring when the movable line merges with the fixed line.

4. **Parallax Horizontal Adjustment for Zeiss Ikon RF/VF**

a. Remove the two cover retaining screws and lift the cover off the RF/VF assembly. Remove the retaining screws and remove the cover plate.

b. Clamp the camera onto the collimator as explained in Section III and aim the camera at the frame target.

c. Observe the frame target through the RF/VF eye lens. Using a jeweler's screwdriver, turn the horizontal adjusting screw until the top horizontal line of the yellow projected frame image is within the area bounded by the 180 close-up target lines when the focus bar is set to CLOSE-UP (Figure 5-49). Also, adjust the same screw until the top horizontal line of the yellow projected frame image is within the area bounded by the 180 infinity target lines when the focus bar is set to INFINITY. When these adjustments have been completed, seal the adjusting screw with shellac. **Don't let the shellac drip into the cantilever assembly.** (Parallax horizontal adjustment can also be made by turning the eccentric which controls the height of the magnet.

d. Position the cover plate on the RF/VF and secure it with its retaining screws. Place the cover back on the RF/VF and replace the two retaining screws.

5. **Parallax Vertical Adjustment for Zeiss Ikon**

a. Remove the two cover retaining screws and lift the cover off the RF/VF assembly. Remove the two screws which hold the cover plate and take the cover plate off the RF/VF.

b. Clamp the camera onto the collimator as explained in Section III and aim the camera at the frame target.

c. Set the focus bar to INFINITY and observe the frame target. Using a jeweler's screwdriver, turn the vertical adjusting screw until the left side vertical line of the yellow projected frame image is within the area bounded by the 180 tilt target lines (Figure 5-50). When the adjustment is complete, seal the adjusting screw with shellac. **Don't let the shellac drip into the cantilever assembly.**

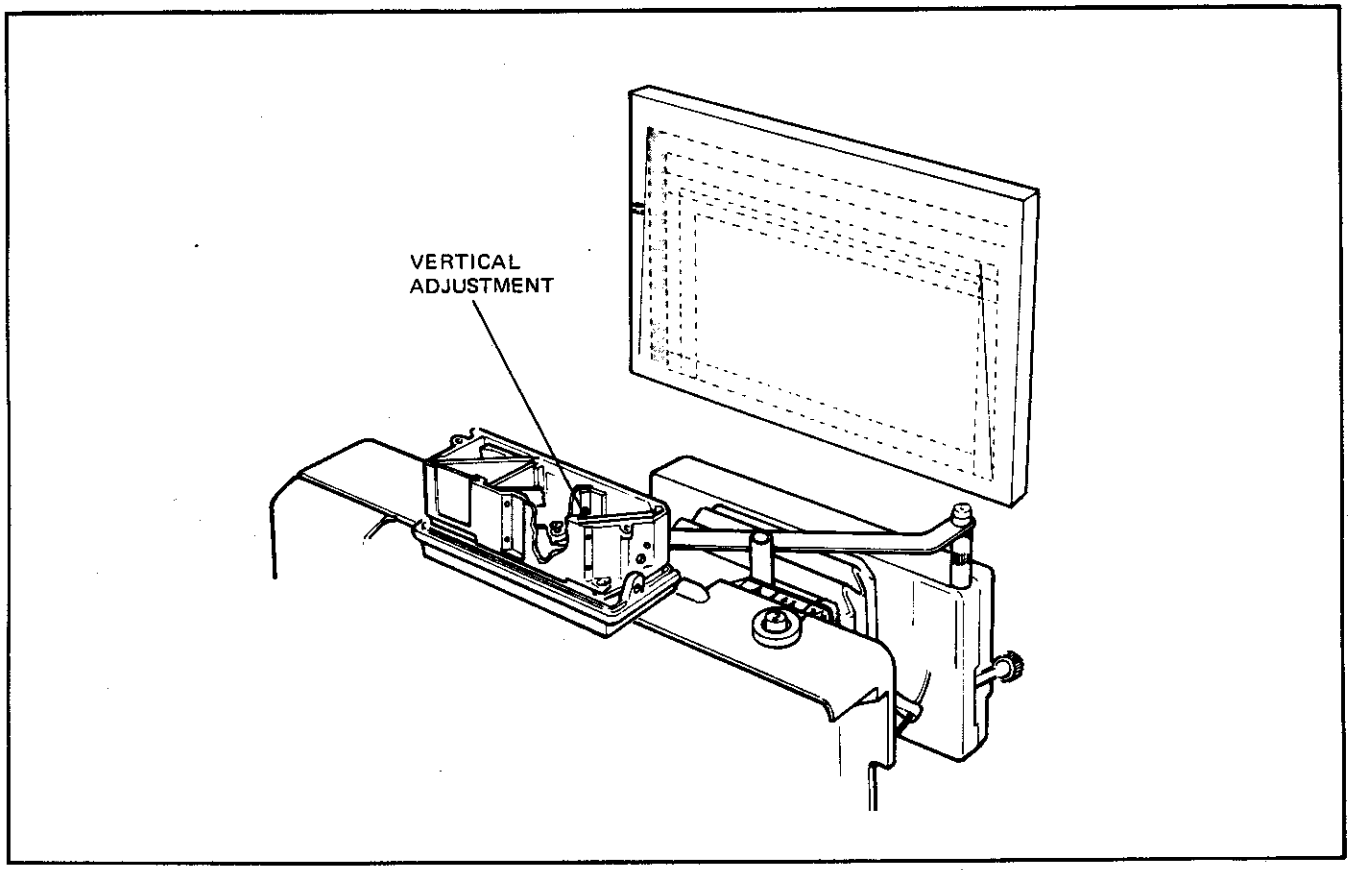


FIG. 5.50 PARALLAX VERTICAL ADJUSTMENT FOR ZEISS IKON RF/VF

d. Position the cover plate on the RF/VF and secure it with its two retaining screws. Place the cover back on the RF/VF and secure it with the two retaining screws.

6. Parallax Adjustments for Polaroid RF/VF

a. Remove the two window plate screws and lift the rear window plate off the RF/VF assembly.

b. Clamp the camera onto the collimator as explained in Section III. Aim the camera at the frame target.

c. Observe the frame target through the viewfinder eye lens. Using tool number 169443, turn the viewfinder optics adjusting screw until the top and right side lines of the projected frame image are within the areas bounded by the 100 close-up and 100 tilt target lines when the focus bar is set to CLOSE-UP (Figure 5-51). Also, adjust the same screw until the bottom and right lines of the projected frame image are within the areas bounded by the 100 infinity and 100 tilt target lines when the focus bar is set to INFINITY. When the adjustments are done,

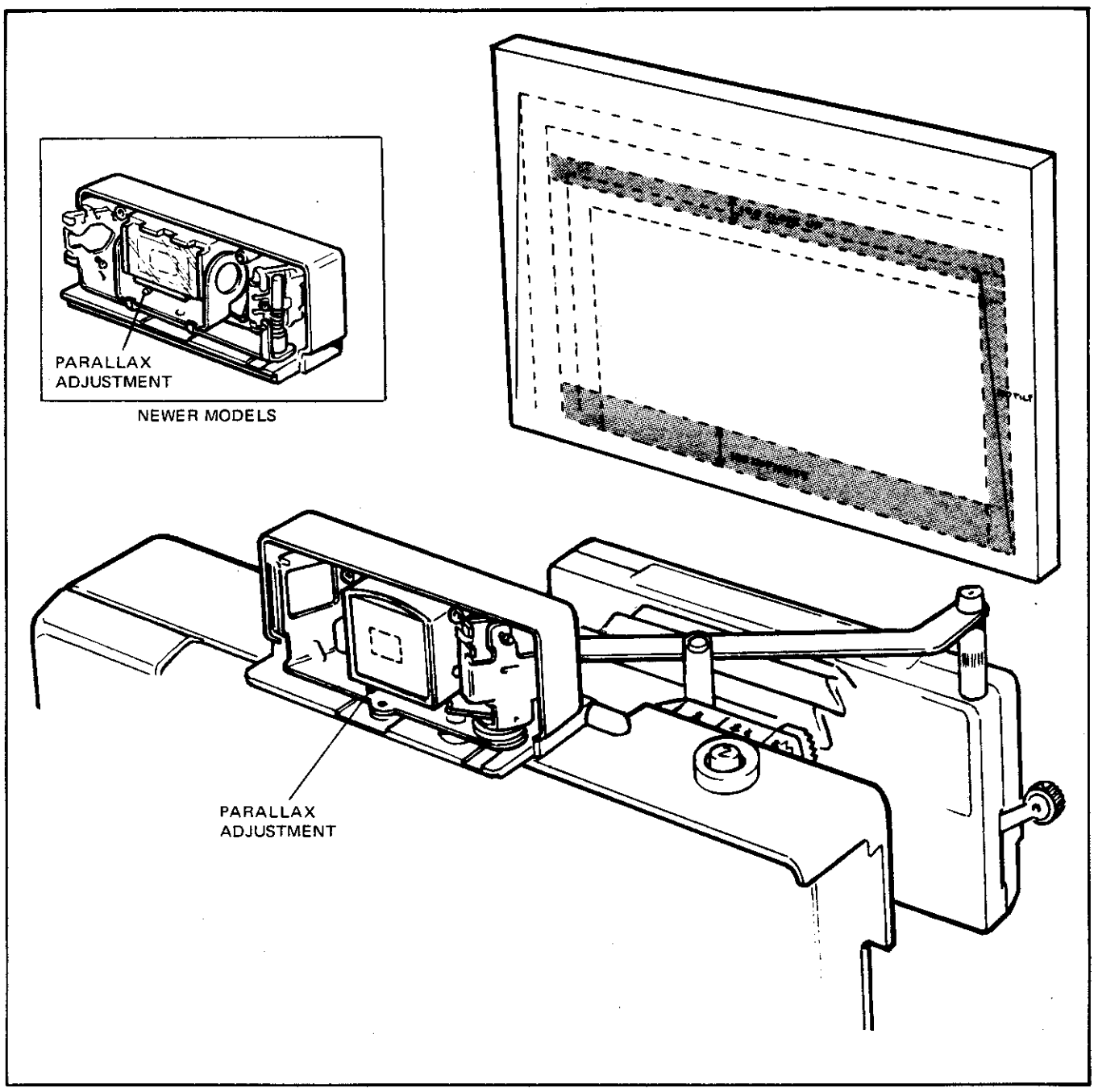


FIG. 5.51 PARALLAX ADJUSTMENTS FOR POLAROID RF/VF

seal the adjusting screw with shellac. **Don't let the shellac drip into the cantilever assembly.** (On folding RF/VF's, parallax horizontal adjustment can also be made through the eccentric screw holding the magnet.)

d. Position the rear window plate on the RF/VF and secure it with the two retaining screws.

LENS COLLIMATION (Triplet Lenses Only)

1. Remove the front cover of the camera and extend the bellows to detent lock-in.
2. Place a mask over the photocell lens to prevent the entry of light.
3. Set the aperture wheel to the "75" position. (Cameras with a film selector should be set at the "75" or "color" position.)
4. Set the scene selector (if present) to the "BRIGHT SUN OR DULL DAY–ALSO FLASH" position.
5. Open the rear door and mount the camera on the collimator. Clamp the focal plane plate into position on the camera. (See Figure 5-52.)

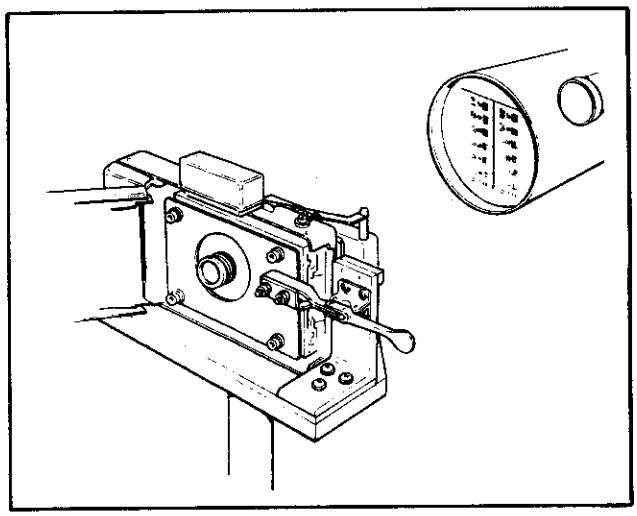


FIG. 5.52 CAMERA MOUNTED ON COLLIMATOR

6. Aim the camera at the infinity tube (collimator) and move the focus bar to INFINITY.
7. Cock and trip the shutter and observe the target through the lens adapter loupe. (The shutter should stay open because of the mask over the photocell.)
8. Position tool #11007 in the lens mount (Figure 5-53). Squeeze the handle until the tool is firmly seated against the mount and

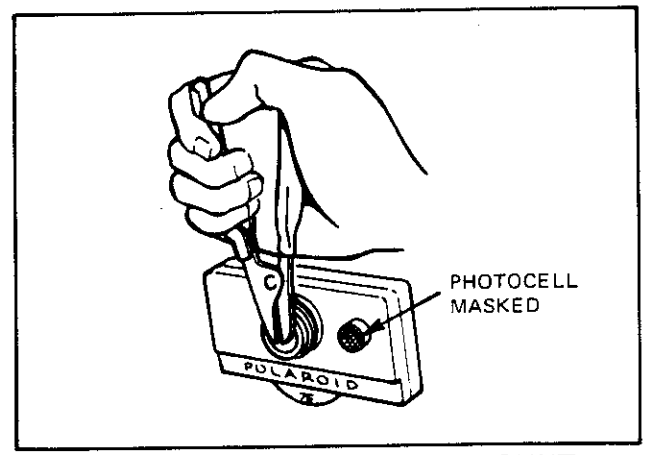


FIG. 5.53 REMOVING THE LENS MOUNT

turn it to break the shellac seal. Remove the entire lens mount.

9. Set the lens mount in lens nest 11394 (Figure 5-54). Put a few drops of methanol on the seal between the front and rear lens

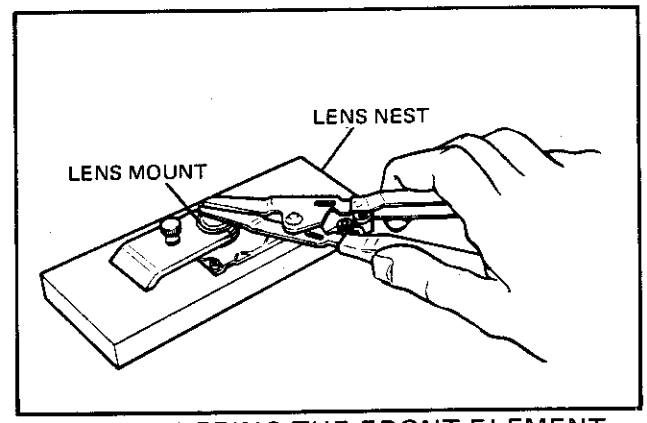


FIG. 5.54 FREEING THE FRONT ELEMENT

elements and let it soak in for a few moments. Then, use tool number 11007 to free the front element from the rear element. Install the lens mount (with the loosened front element) back into the camera.

10. While looking through the lens adapter loupe, slowly adjust the lens until the 40 lines/mm is sharpest.
11. Swivel the camera and fixture around to the four foot resolution target. Move the focus bar toward CLOSE-UP. Stop when the lines of the larger cross-hair target merge.
12. While looking through the lens adapter loupe, slowly adjust the lens mount until the 40 lines/mm is clear. Return to the infinity tube and move the focus bar back to INFINITY. The minimum reading must be 40 lines/mm even after the 4-foot adjustment. If a compromise is necessary in colli-

mating (between the 4-foot target and the infinity target), always compromise in favor of the infinity reading.

13. Secure the front lens to the mount by applying three drops of shellac at equidistant points around the lens. DO NOT DRIP SHELLAC ONTO THE LENS.
14. Perform any necessary Rangefinder/Viewfinder adjustments.

REPLACEMENT OF CANTILEVER ASSEMBLIES AND HOUSINGS IN POLAROID RF/VF

Removal

1. Remove the RF/VF from the camera according to previous instructions.
2. Remove the rear window plate assembly.

   Broken glass in the rear window assembly may be replaced at this point. Thoroughly clean the area of the window frame, removing any remaining glass fragments. Apply heat to open the plastic heat seals. Spread Dupont Duco cement sparingly around the window frame and gently press the new window into place. Wipe any excess cement away immediately.
3. Remove the cantilever assembly from the housing. On some models the assembly is held by a cantilever screw and nut. On other models, the assembly is held by a rivet and a locating pin (see Figure 5-55). On riveted models, use special tool #11397 to remove the rivet. (Pry up the metal band on folding models before lifting the assembly out of the housing.)

   Broken glass on the housing may be replaced at this point, only on folding models. Follow the instructions given above for replacing glass in the housing.

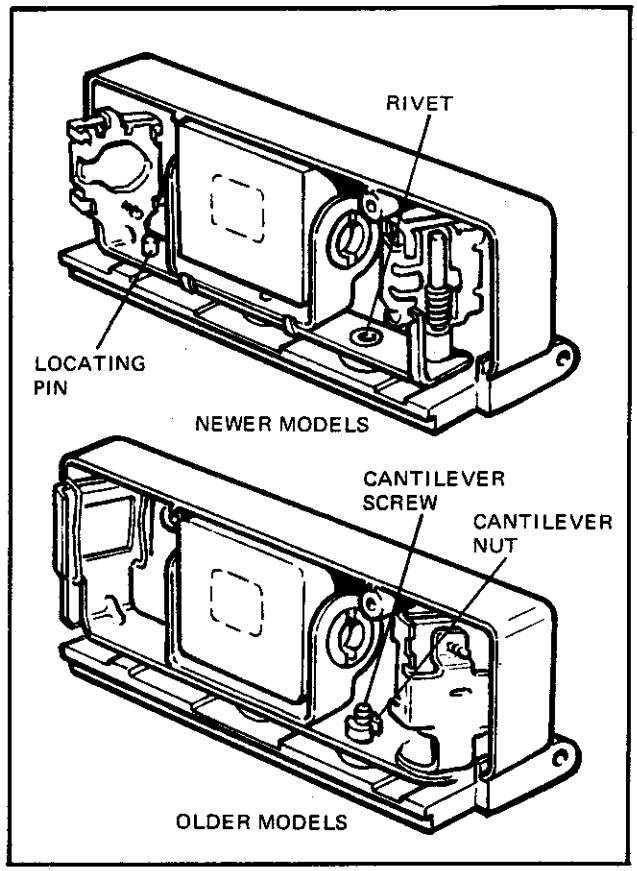


FIG. 5.55 REMOVAL OF THE CANTILEVER ASSEMBLY

4. If the housing is damaged and must be replaced, it is necessary to identify the particular housing model. Use Figure 5-56 to determine the model. If the housing is the old style with a small screw, discard both housing and screw. If a new style with washer and large screw (or large screw and locating pin) force the screw (and locating pin) out of the housing and retain it and the washer for future use. Finally, if the housing is a new style with rivet and locating pin, remove the

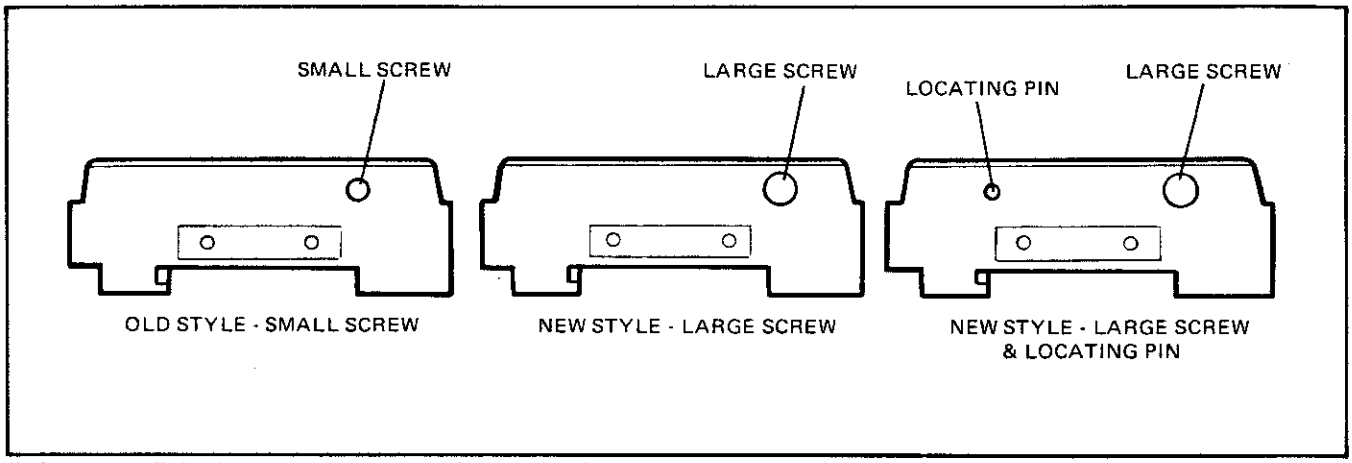


FIG. 5.56 IDENTIFYING THE RF/VF MODEL

pin and save it for future use. Make no attempt to replace an old style housing with another old style. Replace it with one of the newer models. Attempt to salvage the metal band by straightening the two bottom tabs which hold it to the housing.

Replacement

1. Install the hardware on the new housing. (Use the hardware salvaged from the old housing. If a rivet was removed, use a new rivet #A223947.)
2. Install the cantilever assembly on the housing. (If the cantilever assembly is of an old style and is being installed on a housing with a locating pin, you will note that there is no hole on the assembly which corresponds with the location of the pin. It is then necessary to cut off the top portion of the pin as shown in Figure 5-57).

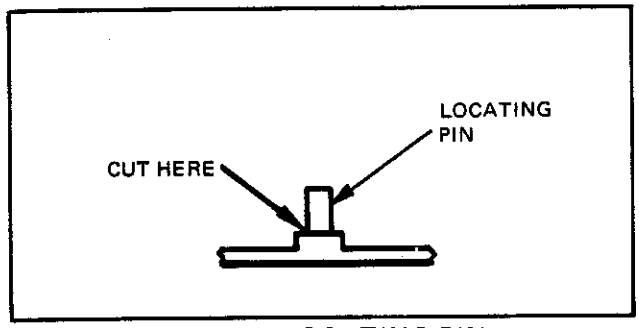


FIG. 5.57 CUT THE LOCATING PIN

Secure the assembly with either the rivet (use special tool #11402 to force the rivet into the housing) or with the cantilever nut. Be sure the washer is replaced. Before tightening the nut or flaring back the rivet (use special tool #11398) align the metal frame of the cantilever assembly with the back edge of the housing (Figure 5-58). (Of course, this isn't necessary if the locating pin is being used on new models.)

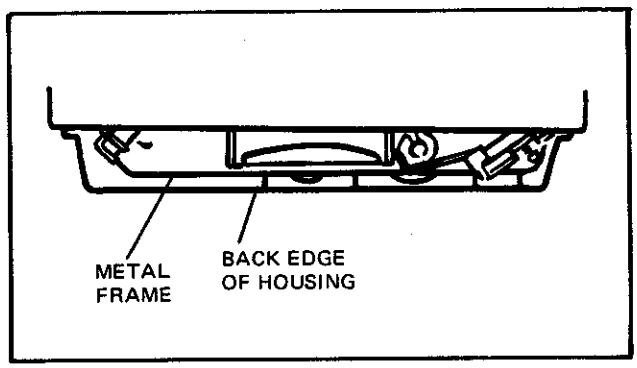


FIG. 5.58 ALIGNING THE CANTILEVER ASSEMBLY AND HOUSING

3. Replace the metal band on the housing of folding models.
4. Install the RF/VF on the camera according to previous instructions. Perform the RF/VF parallax checks called out in Section III. If adjustments are needed, consult the "RF/VF and Image Sizer Adjustments" paragraph of Section V. If the unit cannot be brought into adjustment with these procedures, loosen the cantilever screw and realign the cantilever assembly. Then perform the five adjustments according to the previous cited procedures.
5. Replace the rear window plate assembly.

REPAIR OF THE IMAGE SIZER

Components within the image sizer may be repaired or replaced at the discretion of repair personnel. If it is felt that the effort is economically feasible (when compared to the cost of replacing the entire image sizer), follow the instructions below to repair faulty components within the image sizer assembly. Use the exploded view drawing (Plate B) and parts list in Section VI for guidance.

1. Extend the bellows to detent lock-in, move the focus bar to infinity and open the rear door of the camera. Remove the Phillips-head screw holding the image sizer to the camera body and lift the assembly off the camera. (Note the manner in which the image sizer cam fits into the slot in the focus bar.)
2. Remove the viewfinder screws. Turn the image sizer over so the screw openings are facing the floor and then carefully separate the rear assembly from the front housing.
3. Examine the mirrors and mirror mask inside the rear assembly. If any are defective, replace them. Check the rear assembly itself. If any of the plastic ridges on the inside surface are broken, replace the rear assembly. Also replace it if there are cracks in the walls. Replace the positive lens if it is cracked. Use Dupont Duco cement (or equivalent) to hold the lens in place.

IF THE MASK IS STICKING:

Apply an extremely small amount of Lubriplate along the track of the negative lens. (This is the track in which the light pipe tab rides.) Move the cam back and forth several times to thoroughly work the lubricant into the track. If the mask assembly seems to stick in the "up" position (this

would correspond to the infinity setting) disengage the torsion spring and bend it back so it will exert more tension on the light pipe. Place the spring back on the tab and move the cam back and forth a few times to see if the mask is moving properly. If it is still sticking, continue below. If it is OK and the rest of the image sizer is OK, assemble the rear assembly to the front housing (steps 13, 14, and 15).

4. Remove the cam and disengage the torsion spring from the tab on the light pipe.
5. Carefully pry up the mirror retaining spring and baffle plate from the two posts.
6. Replace any of the inner components which are found to be defective. Before removing either the fixed mask or the negative lens, note how the adjusting spring is installed. Also note the position of the fixed mask. The slant of the adjusting spring slot on the mask runs upward from left to right.
7. Following Plate B of Section VI, reassemble the image sizer. Place the fixed mask on the negative lens and install the adjusting spring. (The shorter side of the spring goes over the mask while the longer side goes over the outside surface of the negative lens. The 90-degree bend in the longer side rides on the top of the lens.)
8. Position the moving mask onto the light pipe and place them over the fixed mask. Be sure the tab on the light pipe fits into the slot on the negative lens.
9. Install the negative lens on the front housing.
10. Install the torsion spring and spacer on the lower post of the negative lens. The short end of the spring must be trapped between the negative lens post and the housing post.
11. Force the baffle plate and mirror retaining spring back over the two posts.
12. Hook the torsion spring onto the light pipe tab and position the cam under the tab. Move the cam all the way to the left (or to the infinity setting).
13. Carefully place the front housing assembly into the rear assembly and secure the two with the assembly screws.
14. Position the cam into the slot on the focus bar (at the infinity setting) and secure the image sizer to the camera body with the Phillips-head screw.
15. Perform the image sizer range and parallax adjustments noted in Section III.

CONVERSION OF 4.5-VDC FLASHGUNS AND REPLACEMENT OF OLD BATTERY CLIPS

Removal

1. Remove the slotted screws holding the mounting foot to the base assembly and remove the mounting foot.
2. Remove and discard the 4.5-vdc battery.
3. Remove the Phillips flat-head screws holding the battery mounting plate and insulator. Discard the mounting plate.
4. Inspect the battery clip under the insulator. If it is a stainless steel or phosphor bronze battery clip, remove and discard it.

Replacement

1. Position a new gold-plated battery clip #155326 into the base assembly.
2. Install the insulator and a new battery mounting plate #155332 and secure them with the two Phillips flat-head screws.
3. To compensate for the size difference between the old 4.5-vdc battery and the new 1.5-vdc battery, it is necessary to add a filler pad to the inside of the mounting foot. Apply a small amount of Elmer's glue to filler pad #168177 and position the pad on the inside surface of the mounting foot as shown in Figure 5-59. (Some of these filler pads are self-adhesive.)

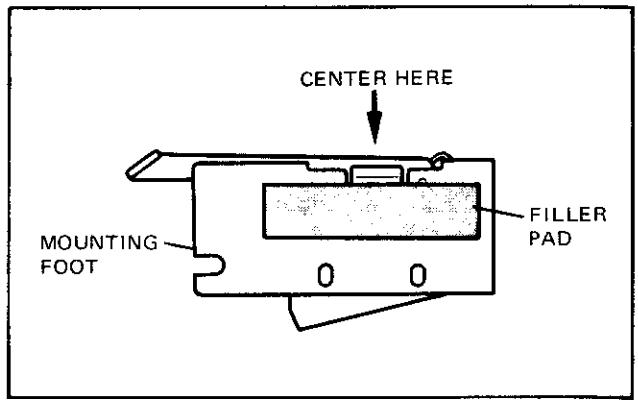


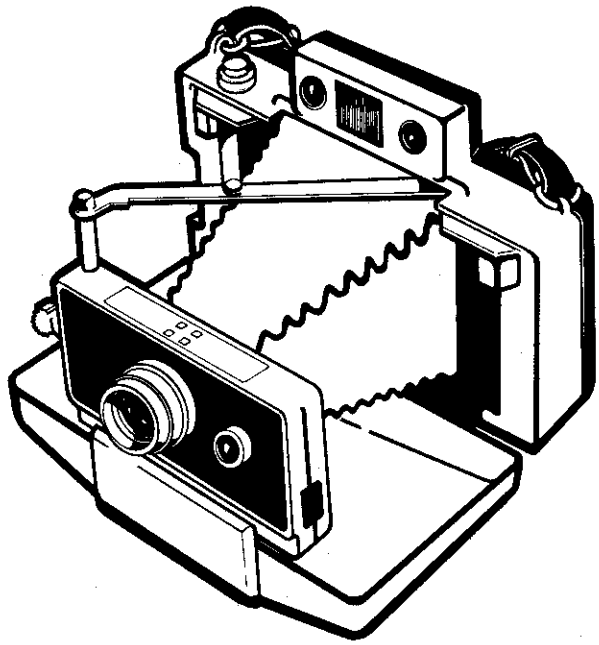
FIG. 5.59 CENTERING THE FILLER PAD

4. Install a new 1.5-vdc battery in the flashgun.
5. Replace the mounting foot on the flashgun and secure it with the two slotted screws.

PARTS CATALOG

POLAROID LAND CAMERA MODELS 100, 101, 102, 103, 104, 125, 135, 210, 215, 220, 225, 230, 240 & 250

JUNE 1, 1970



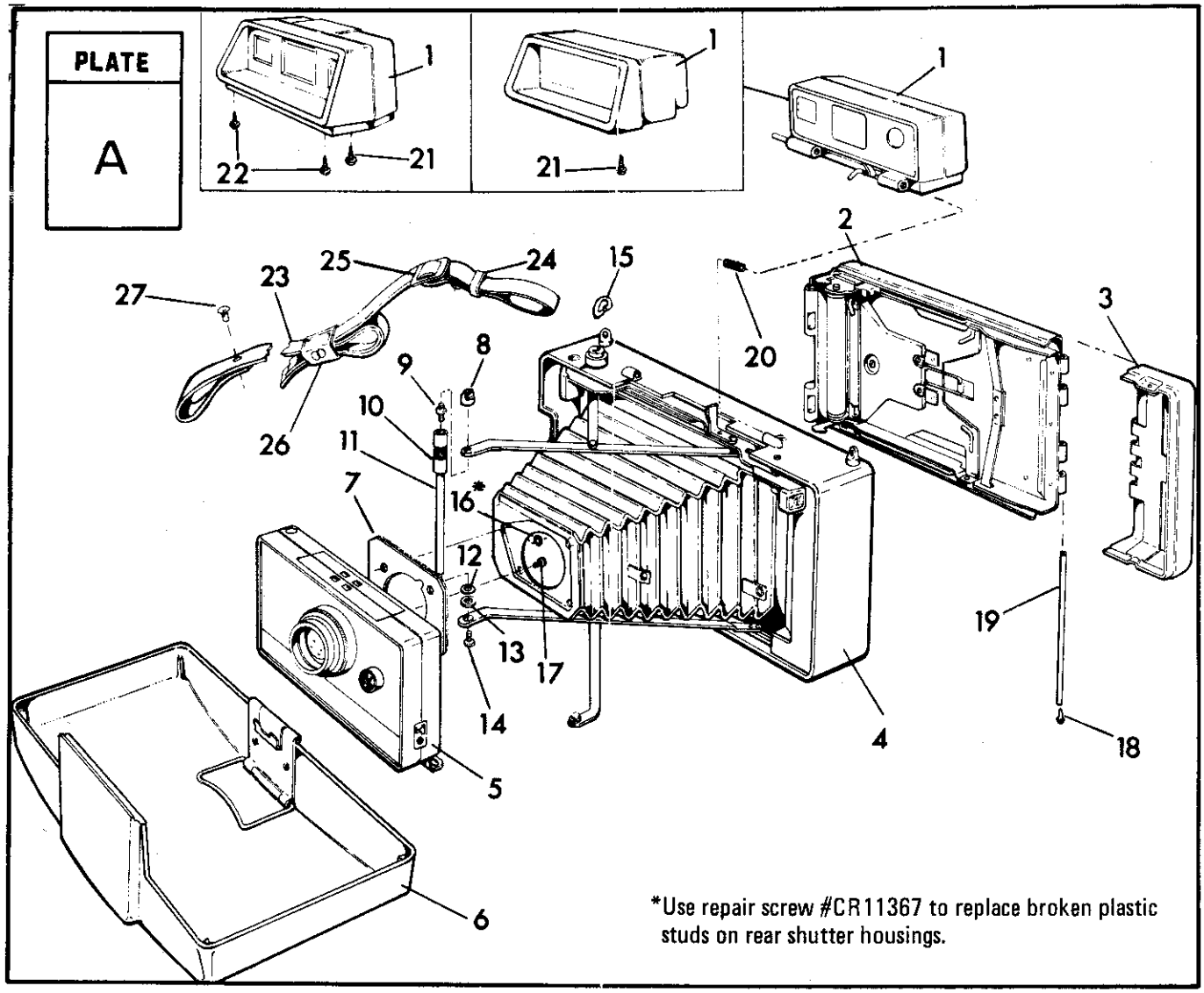
To Order Parts:

Give PART NUMBER, full PART NAME and QUANTITY desired.
Give exact shipping instructions and your complete shipping address.
Address all part orders to:

Polaroid Corporation
Camera Parts Department
89 Second Avenue
Waltham, Massachusetts 02154

Prices F.O.B. Waltham, Massachusetts.
Terms (to accredited accounts): Net 30 days.
Merchandise returns accepted only upon written authorization by Polaroid Corporation.
This price schedule supersedes all previous price schedules.
Prices are subject to change without notice.

PICTORIAL INDEX & COMMON HARDWARE



PICTORIAL INDEX

Key No.	Part Name	Plate
1	R.F.-V.F. Assembly	B & C
2	Rear Door Assembly	D
3	Rear Cover Assembly	D
4	Body Assembly/Bellows	E & F
5	Shutter Assembly	G & H
6	Front Cover Assembly	I

PARTS LIST A

COMMON HARDWARE

PART NUMBER BY CAMERA MODEL

Key No.	Part Name	100,101,102 240,250	Sugg. List Price	103,104,125,135,210 215,220,225,230	Sugg. List Price
7	Bellows Front Frame Light Seal	179731		179731	
8	Detent	157949	See	157949	See
9	Detent Stud	160473	Num	168056	Num
10	Shutter Shaft Sleeve	168099	List	——	List
11	Shutter Shaft	168098		——	
12	Flat Washer	160440		——	
13	Bowed Washer	160442		——	
14	Screw, Shutter Shaft	149570		168055	
15	'D' Ring (2)	160455		——	

Key No.	Part Name	100,240,250	101,102,103,104,125,135 210,215,220,225,230	Sugg. List Price
16	Fastener, Bellows (4)	——	172331	See
17	Screw, Bellows (4)	220968	——	Num Li

Key No.	Part Name	100,101,102 225,240,250	103,104,125,135 210,215,220,230	Sugg. List Price
18	Hinge Plug (2)	157887	168064	See Num List
19	Hinge Pin	149526	149526	

Key No.	Part Name	100,101,102,103 135,230,240,250	104,125,210 215,220,225	Sugg. List Price
20	Spring, R.F. Body	149528	——	See Num List

Key No.	Part Name	104,125 210,215	Sugg. List Price	220,225	100,101,102,103 135,230,240,250	Sugg. List Price
21	Screw, V.F. Mounting (back)	172509	See Num List	204366	——	See Num List
22	Screw, V.F. Mounting (2) (front)	——		204763	——	

Key No.	Part Name	100,102 240,250	Sugg. List Price	101	Sugg. List Price	103,104,210 220,230	Sugg. List Price	125,135 215,225	Sugg. List Price
23	Neck Strap Assy. (includes key no's 24 thru 27)	163016	See Num List	161150	See Num List	161135	See Num List	163260	See Num List

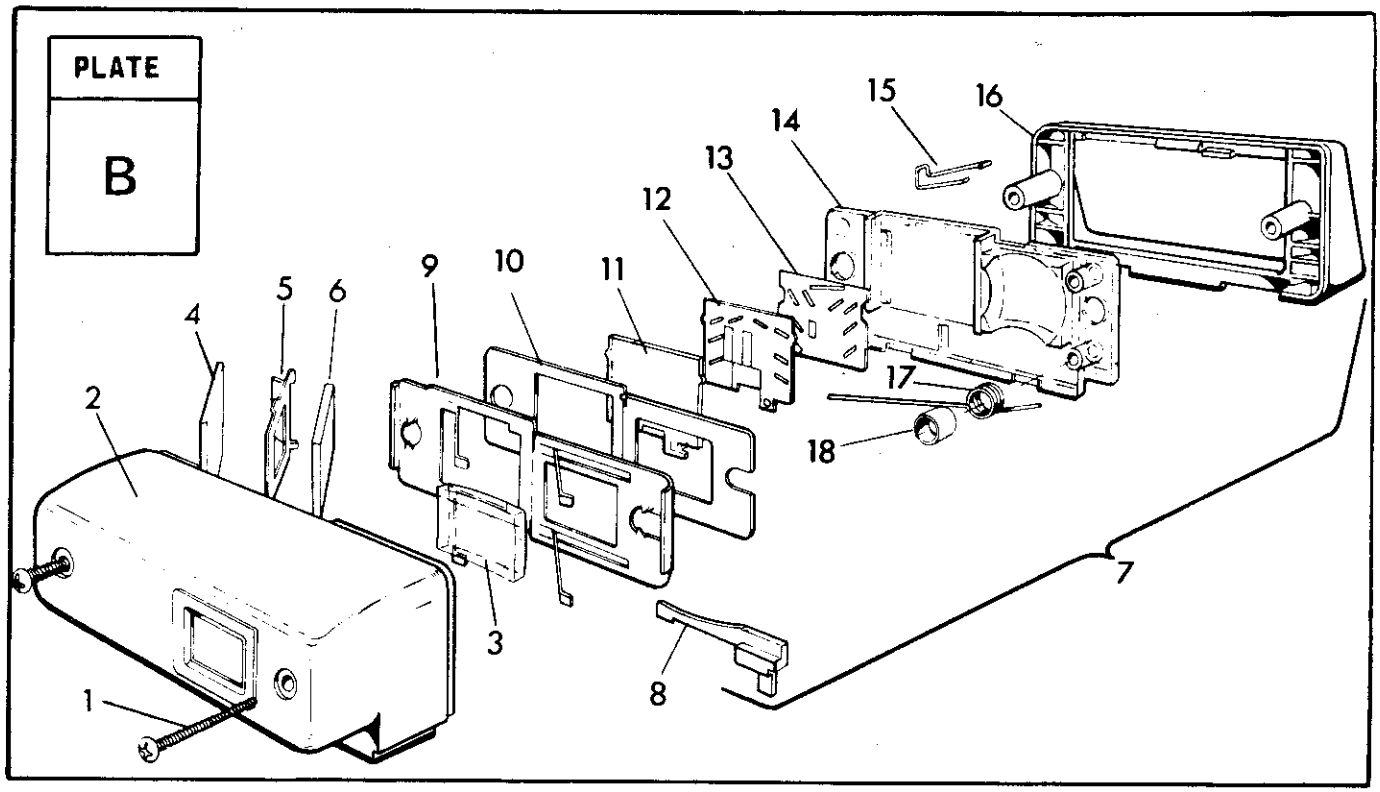
Key No.	Part Name	100,102,125,135 215,225,240,250	101,103,104 210,220,230	Sugg. List Price
24	Keeper	157821	168185	See Num List
25	Tension Slide	157824	168188	

Key No.	Part Name	100,101,102,125 135,215,250	103,104,210,220 225,230,240	Sugg. List Price
26	Neck Strap Band	160573	181136	See Num List

Key No.	Part Name	103,104,210 220,230	125,135 215,225	100,101,102 240,250	Sugg. List Price
27	Rivet, Outside Prong (2)	178046	181251	——	See Num List

VIEWFINDER ASSEMBLY

(Models 104, 125, 210 & 215)

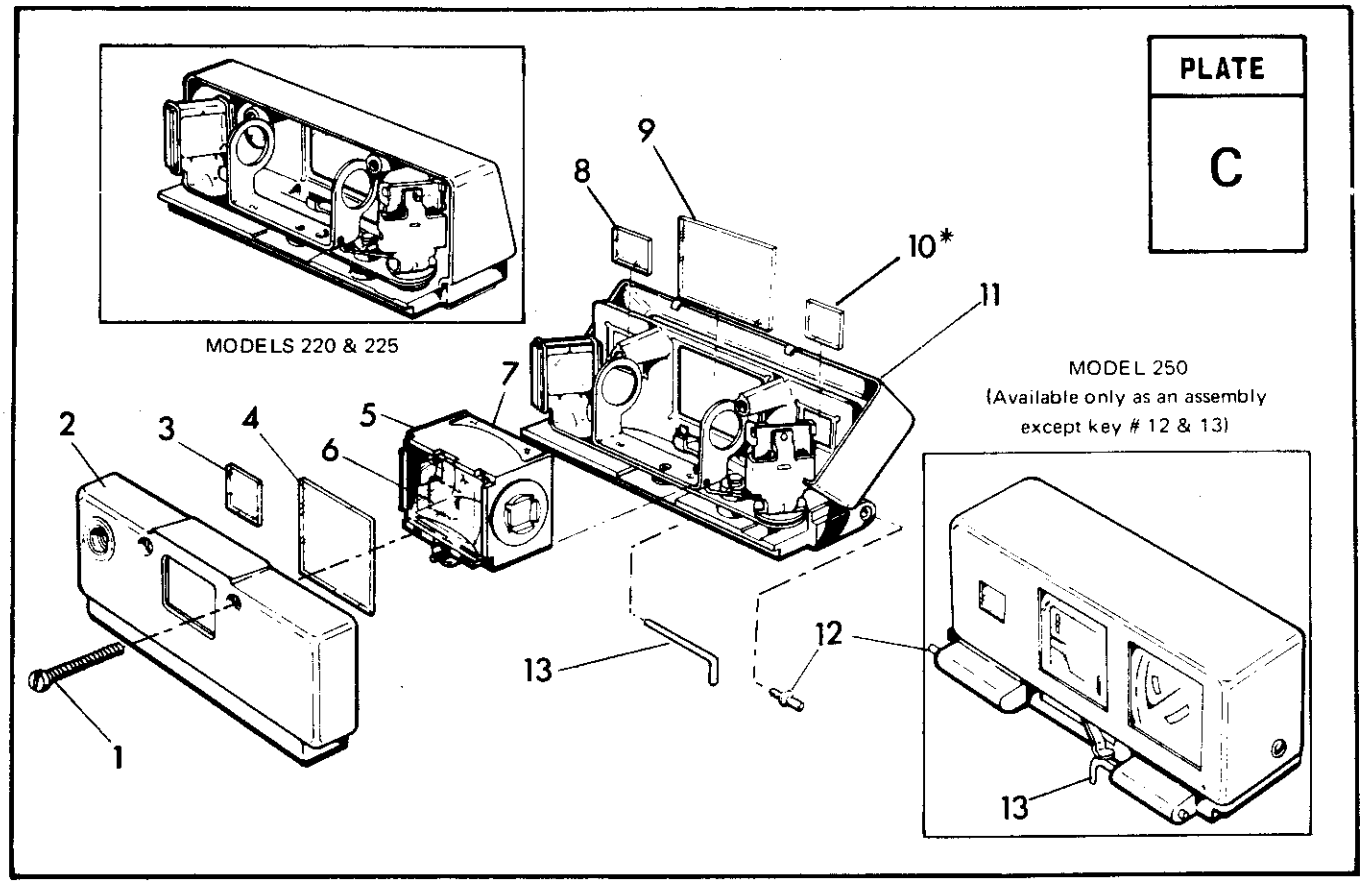


PARTS LIST B

Key No.	Part Name	PART NUMBER BY CAMERA MODEL 104,125,210,215	Sugg. List Price
	Viewfinder Assy. (complete)	172811	
	Viewfinder Assy. (complete) Metric used on Models 104 & 210	172887	
1	Viewfinder Assy. Screw (2)	172528	See Num List
2	Viewfinder Rear Assy.	155486	
3	Positive Lens	163213	
4	Metal Mirror	172637	
5	Mirror Mask	172531	
6	Dichroic Mirror	172620	
7	Viewfinder Front Assy.	155485	
	Viewfinder Front Assy. (metric) used on Models 104 & 210	163327	
8	Cam	155492	
9	Mirror Retaining Spring	163314	
10	Baffle Plate	172713	
11	Light Pipe	155494	
12	Moving Mask	178343	
13	Fixed Mask	178302	
	Fixed Mask (metric) used on Models 104 & 210	181514	
14	Negative Lens	172810	
15	Adjusting Spring	181322	
16	Viewfinder Front Housing	172828	
17	Torsion Spring	161192	
18	Spacer	181254	

RANGEFINDER/VIEWFINDER ASSEMBLY

(Models 100, 101, 102, 103, 135, 220, 225, 230, 240 & 250)

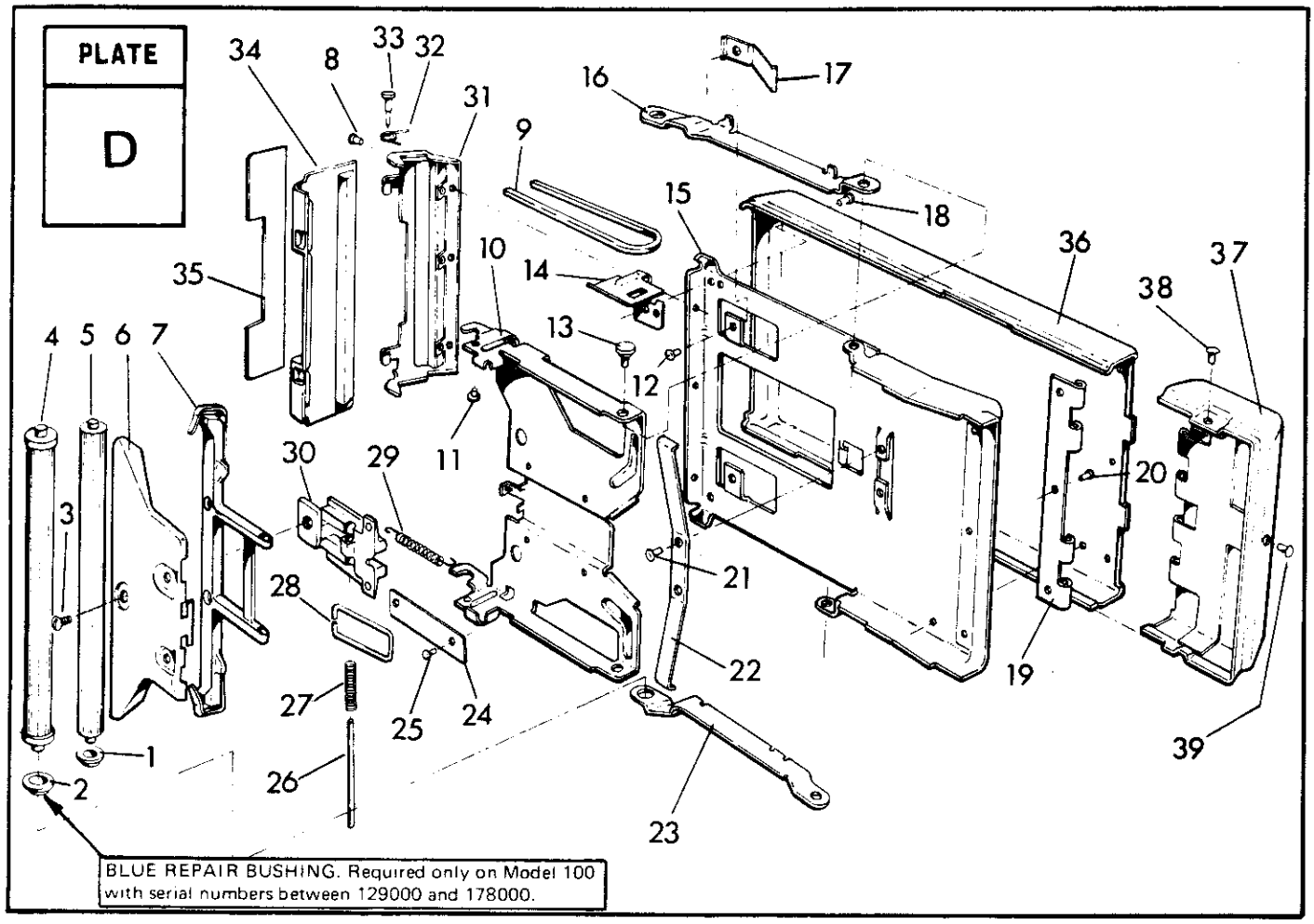


PARTS LIST C

Key No.	Part Name	100,101 102	220	225	230	240	Sugg. List Price	103,135	250	Sugg. List Price
		PART NUMBER BY CAMERA MODEL								
	R.F.-V.F. Assembly (complete)	221414	207907	221469	207060	221414		155558	181540	
1	Screw, Window Plate (2)	179708	179708	179708	179708	179708	See	179708	——	See
2	Rear Window Plate Assy.	155320	163118	163118	163118	155320	Num	163118	——	Num
3	R.F. Eye Window	149571	149571	149571	149571	149571	List	149571	——	List
4	V.F. Window	154556	154556	154556	154556	154556		154556	——	
5	V.F. Optics Assy. (acrylic)	204117	204117	204117	204117	204117		204117	——	
6	Lens, Positive (glass)	154068	154068	154068	154068	154068		154068	——	
7	Lens, Negative (glass)	154069	154069	154069	154069	154069		154069	——	
8	R.F. Window (small)	149533	——	——	149533	149533		149533	——	
9	V.F. Window	154556	——	——	154556	154556		154556	——	
*10	R.F. Window (large)	179730	——	——	179730	179730		179730	——	
11	R.F.-V.F. Band	149709	——	——	149709	149709		149709	——	
12	Hinge Pin (right)	149542	——	——	149542	149542		149542	149542	
13	Hinge Pin (left)	149543	——	——	149543	149543		149543	149543	

*On earlier 100 series cameras this window is the same size as key #8.
If this is the case, order window #149533 instead of window #179730.

REAR DOOR & REAR COVER ASSEMBLY



PARTS LIST D

PART NUMBER BY CAMERA MODEL

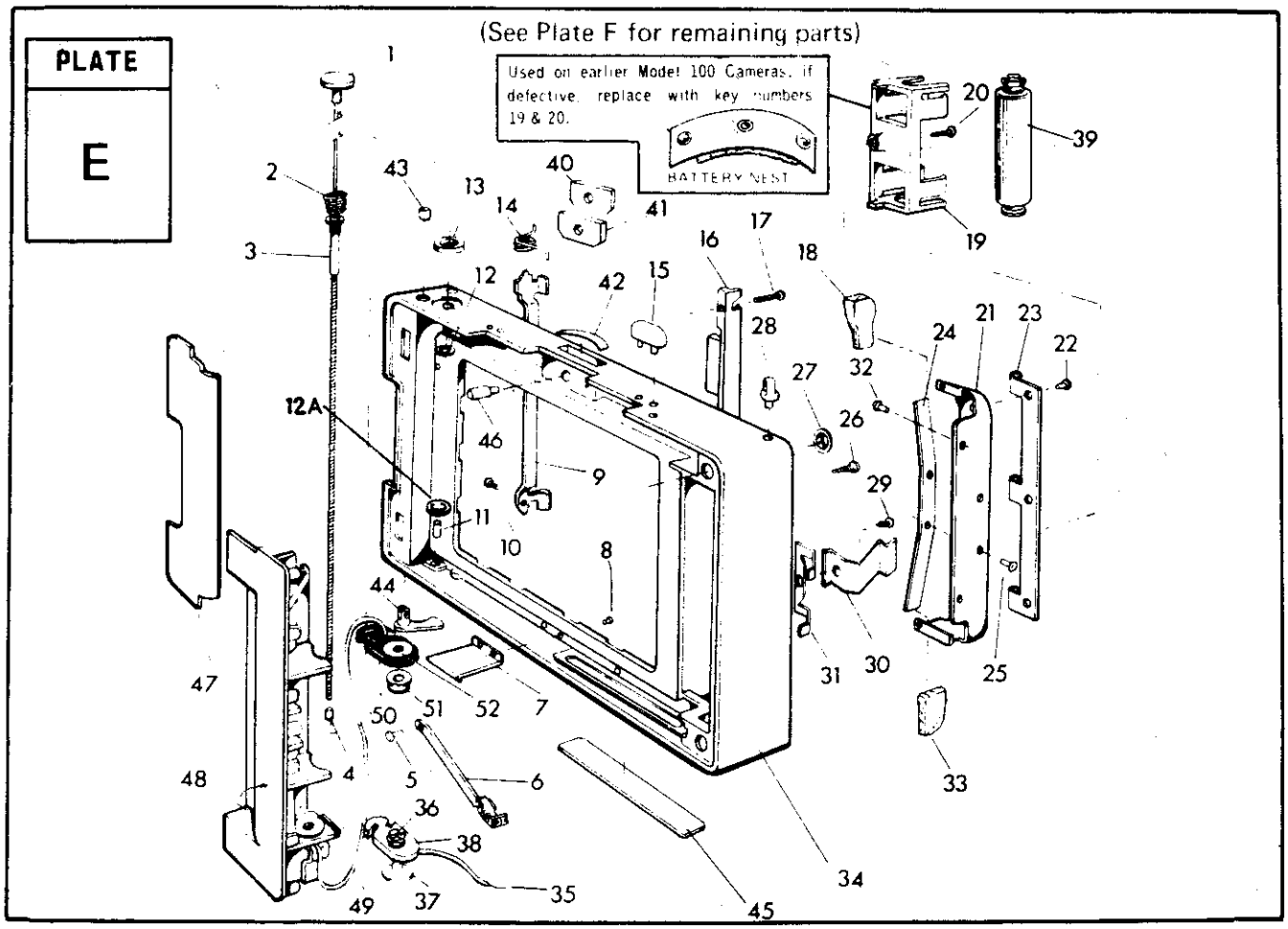
	Part Name	100,101,102 125,240,250	225	Sugg. List Price	103,104,135,210 215,220,230	Sugg. List Price
	Rear Door Assy.	146860	222403	See Num List	163120	See Num List

Key No.	Part Name	All Models	Sugg. List Price
1	Roll Bushing (4)	149517	
2	Repair Roll Bushing (2)	168072	See
3	Screw, Slide Block (3)	157837	Num
4	Front Roll	149613	List
5	Rear Roll	149612	
6	Slide Block Cover	163151	
7	Edge Control Bar Assy.	163154	
8	Rivet, Exit Cover Frame (3)	121741	
9	Spread Roll Spring (2)	155287	
10	Frame Roller Support	149755	
11	Latch Pin	160532	
12	Rivet, Roll Frame Spring (2)	76121	
13	Pivot, Spread Roll (2)	157809	
14	Roll Latch	161121	
15	Rear Door Spider	149766	
16	Front Roll Support (right)	155321	
17	Spring, Roll Frame (2)	157992	
18	Rivet, Rear Door (4)	157897	
19	Door Hinge	146688	
20	Rivet, Door Hinge (3)	121741	
21	Rivet, Door Spring (2)	121741	
22	Door Spring	157904	
23	Front Roll Support (left)	155322	
24	Slide Plate (2)	157842	
25	Rivet, Slide Plate (4)	121741	
26	Shaft	157838	
27	Locating Spring, Edge Control (2)	149574	
28	Link, Slide Block	157839	
29	Spring, Slide Block	157841	
30	Slide Block Assy.	155330	

Key No.	Part Name	100,101,102 240,250	Sugg. List Price	103,104,125,135 210,215,220,230	225	Sugg. List Price
31	Exit Cover Frame Assy.	155282	See Num List	163077	222354	See Num List
32	Pivot Spring, Exit Door	157894		157894	157894	
33	Pivot Stud, Exit Door (2)	157895		157895	157895	
34	Exit Door	157932		155438	222682	
35	Exit Cover Plate	146678		———	———	

Key No.	Part Name	100,101,102 225,240,250	Sugg. List Price	103,104,125 135,210,215	220,230	Sugg. List Price
36	Rear Door	220117	See Num List	168060	168060	See Num List
37	Rear Cover Assy.	155318		163117	204762	
38	Rivet, Rear Cover (top)	157830		157830	157830	
39	Rivet, Rear Cover (side)	157897		157897	157897	

BODY ASSEMBLY & BELLOWS



PARTS LIST E

PART NUMBER BY CAMERA MODEL

Key No.	Part Name	100,101 102	103 135	104 125	210 215	220	225	230	240	250	Sugg. List Price
	Body/Bellows Assy. (includes Key No's. 1 to 85, except Key No's. with asterisks)	155579	155555	172808	204516	204509	221466	204504	204501	188603	SEE NUM. LIST

Key No.	Part Name	100,101,102 240,250	Sugg. List Price	103,104,125,135,210 215,220,225,230	Sugg. List Price
*1	Shutter Release Knob	146689		146689	
*2	Return Spring	149551		149551	
3	Shutter Release Bushing Assy.	155117		155117	
*4	Shutter Release Tip	155106	SEE NUM. LIST	155106	SEE NUM. LIST
5	Rivet, Spring Contact	157877		———	
6	Battery Interlock Assy.	157918		———	
7	Spring, Mounting Plate	157923		157923	
8	Rivet, Mounting Plate (2)	121741		121741	
9	Release Latch	146674		146674	
10	Screw, Release Arm	121180		121180	
11	Pivot Pin, Outer Frame (bottom)	149553		168084	
12	Spacer, Outer Frame (top)	149554		149554	
12A	Spacer, Outer Frame (bottom)	153235		153235	
13	Bezel, Shutter Release	153234		———	
14	Spring, Release Latch	160416		160416	
15	R.F.-V.F. Pivot Pad (2)	149710		———	

Key No.	Part Name	100,101,102 240,250	Sugg. List Price	103,104,125,135,210 215,220,225,230	Sugg. List Price
16	Tab Strip Bar	163085		———	
17	Screw, Tab Strip Bar (2)	160465		———	
18	Filler (left)	157915		157915	
*19	Battery Clip	155426	See Num List	———	See Num List
*20	Screw, Battery Clip	162914		———	
21	Light Seal Assy.	155118		161133	
22	Rivet, Stationary Hinge (3)	121741		121741	
23	Stationary Hinge	146687		155441	
24	Spring Stop	149520		161138	
25	Rivet, Spring Stop (2)	76121		———	
*26	Screw, Left-hand Guard (2)	———		168080	
*27	Fastener, Left-hand Guard (2)	162940		———	
28	Strap Lug (2)	157804		———	
*29	Screw, Rear Cover Latch	160591		———	
*30	Rear Cover Latch	146752		161137	
*31	Center Retainer	160431		———	
32	Rivet, Light Seal (4)	76175		———	
33	Filler (right)	157916		157916	
34	Body Assy. (without bellows & erecting system)	——— Special Order ———		——— Special Order ———	

Key No.	Part Name	100,101,102,220 225,230,240,250	Sugg. List Price	103,104,125 135,210,215	Sugg. List Price
*35	Battery Term. Arm Assy. (Pos.)	X155116		X168063	
*36	Socket	155116	SEE NUM. LIST	168063	See Num List
*37	Eyelet	160409		160409	
*38	Terminal Arm	160406		160406	
*39	Battery	{4.5 Volt 155285}		{3 Volt 163081}	

Key No.	Part Name	100,101,102 103,135,230	Sugg. List Price	240,250	104,125,210 215,220,225	Sugg. List Price
40	Pole Piece (2)	149584	SEE NUM. LIST	188089	———	SEE NUM. LIST
41	Magnet	149870		188090	———	
42	Magnet Spring	160422		195194	———	

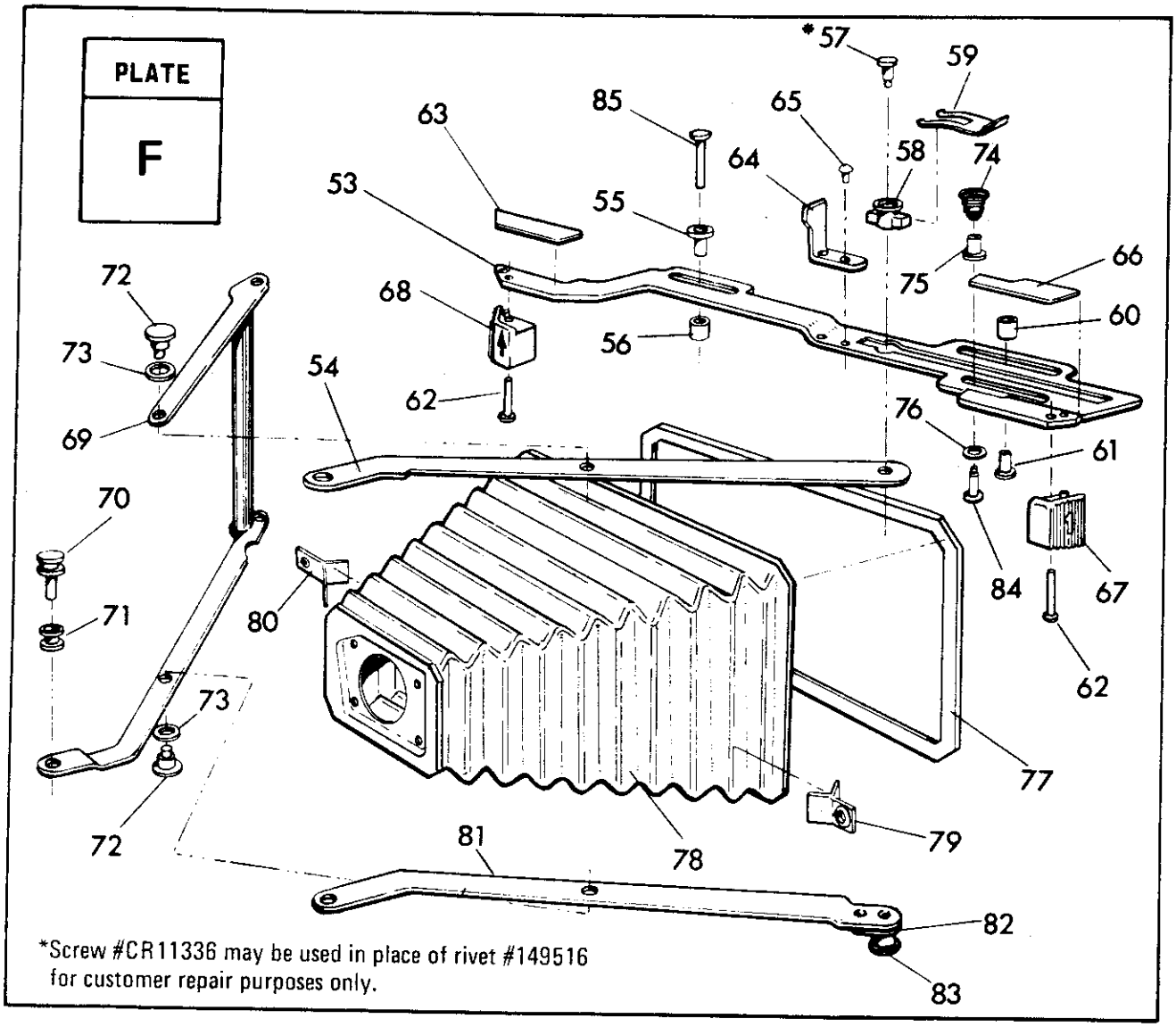
Key No.	Part Name	100,101,102 240,250	Sugg. List Price	225	103,104,125,135 210,215,220,230	Sugg. List Price
43	Latch Pivot	157899	SEE NUM. LIST	222687	172382	SEE NUM. LIST
44	Release Arm	149610		222683	163079	
*45	Slot Cover	149556		222686	168059	

Key No.	Part Name	100,101,102 103,135,230	240	Sugg. List Price	250	104,125,210 215,220,225	Sugg. List Price
46	Magnet Pivot	149547	204091	See Num List	185640	———	See Num List

Key No.	Part Name	100,101 102,250	240	Sugg. List Price	103,104 125,135	210,215	Sugg. List Price	220,230	225	Sugg. List Price
47	Right-hand Guard	146750	195920	See Num List	163261	163261	See Num List	163261	222327	See Num List
*48	Left-hand Guard	———	———		155436	204397		178471	222688	
	Left-hand Guard Assy.	155316	204157		———	———		———	———	
*49	Battery Terminal Arm Assy. (Neg.)	157920	157920		X157920	X157920		X157920	X157920	
*50	Terminal Arm	160405	160405		160405	160405		160405	160405	
*51	Stud	155115	155115		168062	168062		155115	155115	
*52	Eyelet	160409	160409		179729	179729		160409	160409	

BODY ASSEMBLY & BELLOWS

(See Plate E for remaining parts)



PARTS LIST F

PART NUMBER BY CAMERA MODEL

Key No.	Part Name	100,101 102	103 135	104 125	210 215	220	225	230	240	250	Sugg. List Price
	Body/Bellows Assembly cont'd. (includes Key No's. 1 to 85, except Key No's. with asterisks)	155579	204504	172808	204516	204509	221466	204504	204501	188603	See Num List

Key No.	Part Name	100,101 102	Sugg. List Price	103 135	220	225 230	240 250	Sugg. List Price	104 125	210 215	Sugg. List Price
53	Focus Bar Assembly (includes Key No's. 54 to 68)	146848	See Num List	163115	178300	172799	196372	See Num List	178361	204134	See Num List

Key No.	Part Name	All Models	Sugg. List Price
54	Inner Frame (top)	149567	See Num List
55	Sleeve, Focus Bar (right)	154561	
56	Washer, Focus Bar (right)	154558	
57	Rivet, Detent Slide	149516	
58	Detent Slide	149566	
59	Spring, Detent Slide	157869	
60	Sleeve, Focus Bar (left)	154563	
61	Bushing, Focus Bar (left)	155121	
62	Rivet, Focus Button (2)	157860	

Key No.	Part Name	100,101,102 240,250	103,135,220 225,230	104,125 210,215	Sugg. List Price
63	Zone Focus Plate	146684	146684	———	See Num List
64	Focus Bar Bracket	154559	178040	———	
65	Rivet, Focus Bar Bkt. (2)	82760	82760	———	
66	Focus Bar Plate	157919	157919	———	

Key No.	Part Name	100,101,102 103,104,125,135	210,215 220	225,230 240,250	Sugg. List Price
67	Focus Button (left)	149602	204395	196439	See Num List
68	Focus Button (right)	155212	204394	196438	

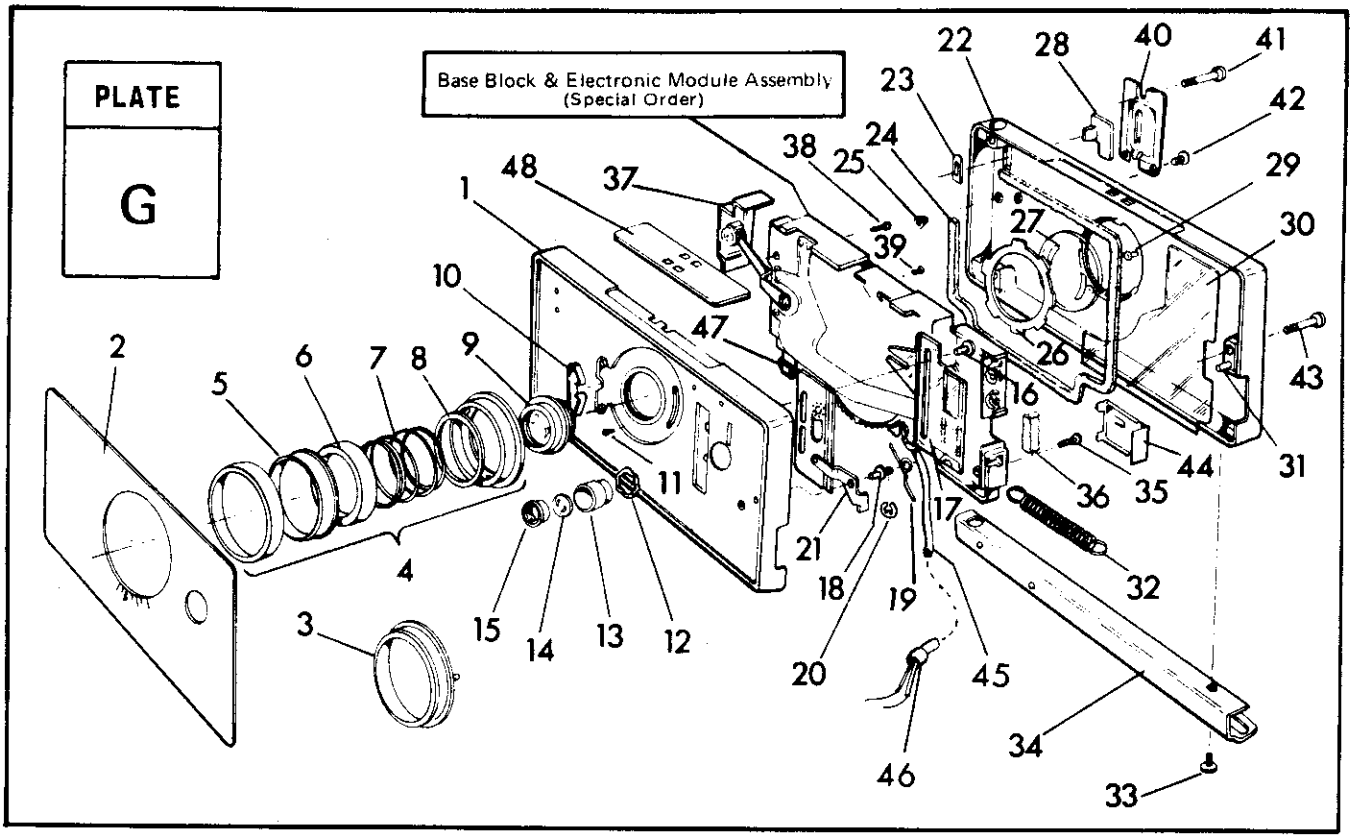
Key No.	Part Name	All Models	Sugg. List Price
69	'U' Frame Assembly	149545	See Num List
70	Rivet, Shutter Mount Spring	162912	
71	Bushing, Shutter Mount	157857	
72	Link Pivot (2)	149581	
73	Spacer, Link Pivot (2)	149552	
74	Brake Spring	155120	
75	Brake Sleeve	154560	
76	Brake Washer	154562	
77	Bellows Light Seal	179732	

Key No.	Part Name	100,101,102,103 104,125,135 220,230,240	Sugg. List Price	210,215 225,250	Sugg. List Price
78	Bellows Assy.	222100	See Num List	196378	See Num List
79	Flash Wire Tab Assy. (2)	157851		204010	
80	Cable Release Wire Tab	160463		204008	

Key No.	Part Name	100,101,102 240,250	Sugg. List Price	103,104,125,135 210,215,220 225,230	Sugg. List Price
81	Inner Frame Bottom Assy.	154575	See Num List	168057	See Num List
82	Track Guide	149550		168082	
83	Rivet, Track Guide	157876		168083	
84	Brake Rivet	154565		168068	
85	Rivet, Focus Bar (2)	154564		168069	

SHUTTER ASSEMBLY

(Models 100, 101, 102, 240 & 250)



PARTS LIST G

PART NUMBER BY CAMERA MODEL

Key No.	Part Name	100	Sugg. List Price	101	Sugg. List Price	102	Sugg. List Price	240	Sugg. List Price	250	Sugg. List Price
	Shutter Assembly-Complete (includes Base Block & Module)	153307	See Num List	155598	See Num List	172806	See Num List	204502	See Num List	198774	See Num List
1	Shutter Front Casting Assy. (includes Key No's 2 thru 21)	153308		172800		172807		204503		188609	
2	Etch Plate, Front Casting	146711		161171		161179		204230		188375	

Key No.	Part Name	100,101 102	Sugg. List Price	240,250	Sugg. List Price
3	Bezel Sub-Assembly	204408	See Num List	———	See Num List
4	Bezel Assy. (complete)	———		204354	
5	Center Ring	149809		149809	
6	Outer Ring	149810		204407	
7	Bezel Spring	149813		149813	
8	Spring Seat	149811		———	
9	Front Lens Assy.	155235		155235	

Key No.	Part Name	100,101 102	Sugg. List Price	240,250	Sugg. List Price
10	Bezel Friction Spring	152525		152525	
11	Screw, Bezel Retaining (3)	149812		———	
12	Wave Washer	155179		155179	
13	Cell Lens Mount	154856	See	154856	See
14	Cell Lens	154071	Num	154071	Num
15	Cell Lens Retainer	154857	List	154857	List
16	Rivet, Cell Wedge (2)	149838		149838	
17	Cell Wedge	220796		220796	
18	Pivot Pin, Actuating Arm	149829		149829	
19	Spring, Actuating Arm	149831		149831	
20	Retaining Ring	155161		155161	
21	Flash Filter Act. Arm Assy.	153311		153311	

Key No.	Part Name	100,240 250	Sugg. List Price	101,102	Sugg. List Price
22	Shutter Rear Casting Assy. (includes Key No's 23 thru 34)	153310		155586	
			See		See
23	Release Block Retainer	152521	Num	152521	Num
24	Shutter Gasket	155331	List	155331	List
25	Retainer, Rel. Cover Screw (2)	———		172398	
26	Rear Lens Retainer/Mtg. Plate	154046		161160	
27	Lens, Rear Positive	155242		155242	
28	Shutter Release Block	146722		146722	
29	Rivet, Rear Lens Mtg. Plate (3)	———		172313	
30	Elec. Mtg. Board Insulator	157939		———	
31	Dowel Pin (2)	149821		———	
32	Shutter Mount Spring	172320		172320	
33	Screw, Shutter Mount	149538		172501	
34	Shutter Mount/Erecting Bkt.	52403		161162	
35	Screw, Module Mounting (2)	149817		149817	
36	Circuit Light Seal	160568		160568	
37	Front Casting Light Seal	163301		163301	
38	Screw, Base Block Mtg. (Models 100,101 & 102 have 2)	149865		149865	
39	Screw, Base Block Mtg. (short)	157866		157866	
40	Cable Release Cover	149740		163173	
41	Screw, Shutter Fstg. (long)	149822		149822	
42	Screw, Release Cover (2)	154870		172500	
43	Screw, Shutter Fastening (2)	149828		149828	
44	Cap Stop Bracket	155376		155376	

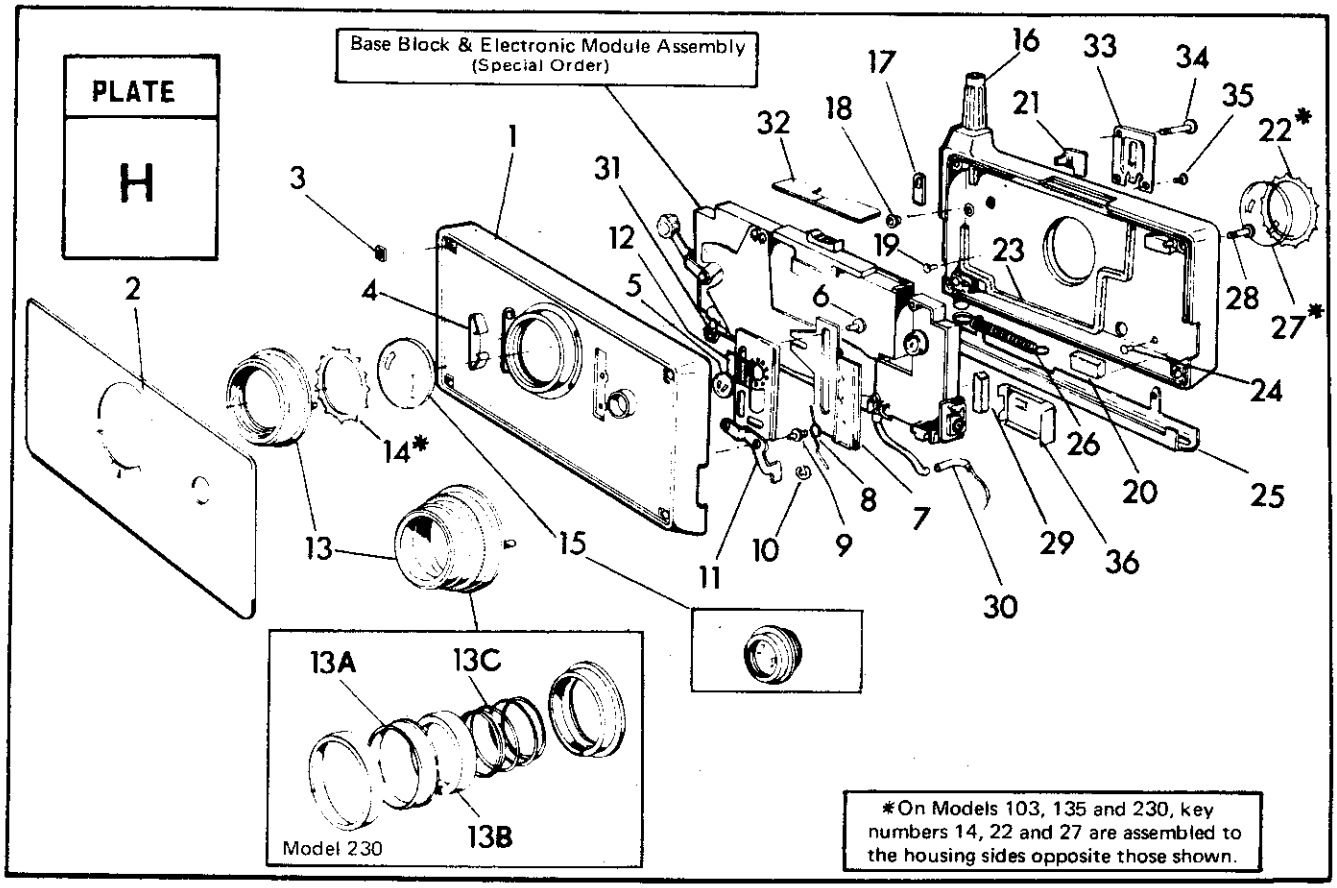
Key No.	Part Name	100,101 102,240	Sugg. List Price	250	Sugg. List Price
*45	Battery Wire Assy.	155250	See	204007	See
46	Banding Clip	130501	Num List	130501	Num List

Key No.	Part Name	100	101,102	Sugg. List Price	240,250	Sugg. List Price
47	Scene Selector Button	154076	170992	See	196248	See
48	Top Etch Plate	157940	170991	Num List	196034	Num List

*Do not unsolder the battery wire on models with teflon printed circuits. An additional charge will be made for damaged circuits.

SHUTTER ASSEMBLY

(Models 103, 104, 125, 135, 210, 215, 220, 225 & 230)



PARTS LIST H

PART NUMBER BY CAMERA MODEL

Key No.	Part Name	103	104	125	135	210	215	220	225	230	Sugg. List Price
	Shutter Assy. Complete (incl. Base Block & Module)	155554	172852	172858	178590	204517	196769	204512	221468	204505	See Num List
1	Shutter Front Housing Assy. (incl. Key No's. 2 thru 15)	155552	172813	172857	178589	204520	204194	204514	221472	204506	
2	Front Etch Plate	161130	161185	163259	188352	204233	163253	204232	222073	204231	

Key No.	Part Name	103,104,125,135,210,215,220,225,230	Sugg. List Price
3	Housing Nut (4)	168091	See Num List
4	Bezel Friction Spring	152525	
5	Cell Lens	154071	
6	Rivet, Cell Wedge	149838	
7	Cell Wedge	220796	
8	Spring, Actuating Arm	178081	
9	Pivot Pin, Actuating Arm	149829	
10	Retaining Ring	155161	
11	Flash Filter Act. Arm Assy	153311	

Key No.	Part Name	220,225	103,104,125,135 210,215,230	Sugg. List Price
12	Filter (used with Polaroid Plastic Lenses)	220958	———	See Num List

Key No.	Part Name	103,135	104,125,210 215,220,225	Sugg. List Price	230	Sugg. List Price
13	Bezel	163126	163198		———	
	Bezel Assy. (complete)	———	———		204408	
13A	Center Ring	———	———		149809	
13B	Outer Ring	———	———		149810	
13C	Bezel Spring	———	———		149813	

Key No.	Part Name	104,125	210,215 220,225	Sugg. List Price	103,135 230	Sugg. List Price
14	Front Lens Retainer	172623	172623		163069	
15	Front Lens	172616	172616 * Or 204403		———	
—	Lens Assy.	———	———		155235	

Key No.	Part Name	103 135	104 125	210 215	220	225	230	Sugg. List Price
16	Shutter Rear Housing Assy. (includes Key No's. 17 thru 27)	155551	196768	196768	204515	221473	188605	See Num. List

Key No.	Part Name	103,135 230	Sugg. List Price	104,125,210 215,220,225	Sugg. List Price
17	Release Block Retainer	152521		152521	
18	Retainer, Release Cover Screw (2)	172398		172398	
19	Rivet, Rear Lens Mtg. Plate (3)	172313		———	
20	Retainer, Electronic Block (2) (Models 220,225 & 230 have 1)	178043		178043	
21	Shutter Release Block	146722		146722	
22	Rear Lens Retainer/Mtg. Plate	161160		172623	

Key No.	Part Name	103,104,125 135,210,215	Sugg. List Price	220,225	230	Sugg. List Price
23	Shutter Gasket	163116		155331	155331	
24	Rivet, Shutter Mount (2)	168049		198844	198844	
25	Shutter Mount	163193		204108	222452	
26	Shutter Mount Spring	172381		172381	172381	

Key No.	Part Name	104,125	210,215 220,225	Sugg. List Price	103,135 230	Sugg. List Price
27	Lens, Rear Positive	172616	172616 * Or 204402		211469	

Key No.	Part Name	103,104 125,135	210,215	Sugg. L.P.	220,230	225	Sugg. List Price
28	Screw, Shutter Fastening (3) (Models 220,225 & 230 have 2)	168048	168048		168048	168048	
29	Circuit Light Seal	———	———		160568	160568	
30	Battery Wire Assy.	163076	204398		204434	222694	
31	Scene Selector Button	———	———		196248	196248	
32	Slider Decorative Plate	163068	196033		196034	196034	
33	Cable Release Cover	163114	163114		163114	222684	
34	Screw, Shutter Fstg. (long)	168047	168047		168047	168047	
35	Screw, Release Cover (2)	172500	172500		172500	172500	
36	Cap Stop Bracket	155376	155376		155376	155376	

*#172616 is manufactured by American Optical and cannot be intermixed with Polaroid lenses #204402 and #204403.